# *The* Cost *of* Tobacco *in* Nova Scotia

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*Cancer Care Nova Scotia*

# The Cost of Tobacco in Nova Scotia

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## Executive Summary

Conventionally, smoking is counted as a benefit to the economy. Canadians spend nearly $10 billion a year on tobacco products, smoking 45 billion cigarettes a year. Nova Scotians smoke 1.5 billion cigarettes a year, contributing $295 million to the province's annual gross domestic product (GDP). Smoking continues to make the economy grow with spending on nicotine replacement therapy and doctor, hospital and drug bills to pay for smoking-related illnesses. Because current measures of progress based on economic growth statistics make no distinction between economic activities that create benefit and those that cause harm, spending generated by smoking, crime, pollution, car accidents and other liabilities are conventionally counted as signs of economic growth, prosperity and well being.

In the Genuine Progress Index (GPI), by contrast, smoking is counted as a cost rather than a gain to the economy, because it causes sickness and premature death. Money not spent on smoking could be spent on more productive activities. In Nova Scotia, spending diverted from imported tobacco products would stimulate the local economy, because the new spending would include a higher proportion of locally produced goods and services.

Tobacco costs the Nova Scotia health care system $168 million a year in direct health care costs. Smoking kills about 1,650 Nova Scotians and more than 45,000 Canadians every year. When productivity losses due to premature death and absenteeism are added to medical costs, smoking costs the Nova Scotia economy more than half a billion dollars annually. In addition, it costs Nova Scotia employers about $250 million more a year (or $2,280 per smoker) to employ a smoker than a nonsmoker, in lost on-the-job productivity, excess absenteeism, higher life insurance premiums, and smoking area costs.

Nova Scotia currently has the highest smoking rate in Canada (29%), the heaviest consumption of cigarettes per smoker, and the highest rate of nicotine addiction in the country. 28% of pregnant mothers smoke and 31% of teenagers 15-19 years old smoke in Nova Scotia, with teen smoking rates up throughout Canada compared to 1990. At today's rates, more than 65,000 Nova Scotia children and teens alive today will become regular smokers. Of these, 15,000 will be killed by their addiction in middle age, each losing about 22 years of nonsmoker life expectancy.

If 10% of Nova Scotia smokers quit, the province would save $1 billion over 30 years and save 92,000 life years, compared to the costs incurred if these quitters had kept smoking. If the province restored tobacco taxes to pre-1994 levels, savings would be nearly $3 billion. There are currently 16,000 underage smokers in Nova Scotia spending $10.6 million annually on cigarettes. These illegal sales yield $6.4 billion in federal and provincial taxes, eight times Nova Scotia's current tobacco control budget. Price elasticity studies show that every 10% increase in the price of cigarettes will reduce smoking among Nova Scotia teenagers by 7%.

This study also examines in detail the cost effectiveness of different tobacco control strategies, including school-based smoking prevention curricula, counseling for pregnant mothers, anti-tobacco advertising, physician advice, and smoking bans at work and in public places. For example, every dollar spent in delivering Nova Scotia's exemplary "Smoke-Free for Life" curriculum would yield more than $15 in savings from avoided health care and productivity losses. Delivered to all 76,000 Nova Scotia 10-15 year-olds, it would save $70 million a year. Similarly, every dollar invested in counseling pregnant smokers will yield more than $10 in savings on intensive neonatal care for low birth-weight babies, long-term infant care costs, and avoided health care costs for the mothers.

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# INTRODUCTION

## *1. Smoking: Cost or Benefit?*

Tobacco is the only product sold legally that causes sickness and death when used exactly as intended.[1] Worldwide, tobacco kills one in 10 adults. By 2030, it will kill one in 6, or 10 million people a year -- more than any other single cause.[2] Health Canada reports that 21% of all deaths in Canada are attributable to smoking -- 45,000 preventable deaths a year.[3] One-half of all long-term smokers will die early as a result of smoking, and one-half of those will die in middle age, losing 20-25 years of life.[4]

Smoking causes fatal and disabling disease, including cancer, heart disease, and respiratory illness, and is highly addictive. About 70% of adult smokers say they regret starting to smoke and would like to stop.[5] Second-hand smoke causes lung cancer, increases the risk of death from heart disease, and causes respiratory illness in children. Smoking by pregnant women can harm the fetus.[6]

There seems no doubt at all that tobacco is a tremendous cost to modern society. But that is *not* the message that our current indicators of well-being and progress communicate to policy-makers and the public. Currently we assess how "well off" we are as a society primarily by how strong the economy is. We actually use the language of health to describe a growing economy as "healthy," "robust," and "dynamic." When people spend more money, we say "consumer confidence" is "strong."

By these standards, tobacco makes a tremendous contribution to our economic health and well-being. Nova Scotians spend nearly $300 million a year on tobacco products, about 1.5% of the provincial gross domestic product (GDP), and consume nearly 1.5 billion cigarettes annually. Nationally, 45 billion cigarettes were sold for nearly $10 billion.[7]

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[1] Moore, Michael and Charles Mikhail, "A New Attack on Smoking Using an Old-Time Remedy," *Public Health Reports*, May-June 1996, volume 111, page 1999.

[2] The World Bank, *Curbing the Epidemic: Governments and the Economics of Tobacco Control*, The World Bank, Washington D.C., 1999, page 1.

[3] Health Canada, "Deaths in Canada due to Smoking," *Information Sheet*, 18 January, 1999.

[4] Canadian Cancer Society, *Surveying the Damage: Cut-Rate Tobacco Products and Public Health in the 1990's*, Canadian Cancer Society et. al., Ottawa, Ontario, 1999, page 3.

[5] World Bank, op. cit., page 2.

[6] Nova Scotia Department of Health, *Smoke-Free Places: Towards Healthier Communities in Nova Scotia: A Discussion Paper*, Nova Scotia Department of Health, Halifax, 1997, page 3.

[7] Nova Scotia domestic cigarette sales from Health Canada, Office of Tobacco Control, September, 1998, and derived from the 1999 Health Canada - Statistics Canada *Canadian Tobacco Use Monitoring Survey* (hereafter referred to as *CTUMS*), February-June 1999, supplementary tables. National domestic cigarette sales are from Statistics Canada, *CANSIM* database, Matrix 46, Table D 2091: monthly statistics were summed by author for 1999 total. National expenditures on tobacco products are from Statistics Canada's *National Income and Expenditure Accounts*. Nova Scotia spending is estimated from three sources: 1) Based on proportionate cigarette consumption according to *CTUMS*, the National Income and Expenditure Accounts would indicate likely Nova Scotia spending of about $340 million. That figure includes all tobacco products, including fine-cut, tobacco sticks and cigars. 2) Office of Tobacco Control and CTUMS consumption data of 1.47 billion cigarettes at $5 a pack would yield spending of about $295 million. If all

But tobacco continues to contribute to GDP in spending on nicotine replacement therapy and other quit efforts, and then adds about $120 million more in spending on hospitals, doctors and drugs to treat tobacco-related illnesses, [8] thus accounting altogether for more than 2% of total spending in the province.

Measures of well-being and progress based on the GDP and economic growth statistics make no distinction between economic activities that create benefit and those that cause harm. Smoking, crime, pollution, sickness, greenhouse gas emissions, natural disasters and other liabilities all contribute to the GDP, simply because money is spent. "More" is always "better" when progress is gauged by economic growth rates.

Not surprisingly, our "health" budgets are actually "sickness" budgets, with 98% of total health budget spending going to sickness treatment and less than 2% to health promotion and disease prevention. Though smoking is acknowledged as the single most preventable cause of disease and death, and accounts for more than 6% of provincial health care spending, tobacco control activities merit less than 0.25% of health care spending in the province.[9]

By contrast, the Genuine Progress Index (GPI) explicitly counts tobacco, cancer and other liabilities as costs rather than gains to the economy, and counts tobacco control *not* as a cost, but as a highly cost-effective investment in public health. Population health is a core component of the GPI, and a *decline* in tobacco consumption and spending is therefore a key indicator of improved population health, well-being and progress.

In the GPI "less" is frequently "better." Simply put, the GPI goes up when the costs of crime, pollution, smoking, obesity, sickness and other liabilities go down. From the GPI perspective, money not spent on tobacco and tobacco-related illness can be invested in productive activities that improve the quality of life. By measuring tobacco and other costs explicitly, we hope to direct policy attention to preventive measures that can not only improve the well-being of Nova Scotians, but save huge sums of money in the long-term and thus contribute to genuine prosperity.

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cigarettes were purchased at the average carton price of $38.97 (or $4.87 a pack), spending would be $286.3 million. 3) Statistics Canada, *Spending Patterns in Canada 1998,* catalogue no. 62-202-XPE, reports tobacco spending of $719 per household averaged over all Nova Scotian households, for a total of $252 million. Since reported household spending on tobacco is probably underestimated, the $300 million figure is used here as more reflective of actual sales and consumption data. 1999 cigarette consumption was 22% higher than in 1992 and 32% higher than in 1991.

[8] Eric Single, Lynda Robson, Xiaodi Xie and Jurgen Rehm, *The Costs of Substance Abuse in Canada,* Canadian Centre on Substance Abuse, Ottawa, 1996, Table 12, adjusted to 1999 dollars using the Consumer Price Index for Nova Scotia Health Care (Statistics Canada, *CANSIM* database, Matrix 9960, Table P203085), and section 6.2 below for further adjustments based on Health Canada data on smoking-attributable mortality.

[9] Percentage derived from Nova Scotia Department of Health, Tobacco Control Unit, *Supporting a Nova Scotia Comprehensive Tobacco Strategy that Works,* February, 2000; and Province of Nova Scotia, Department of Finance, *Estimates for the Fiscal Year 1999-2000.*

# PART 1: TOBACCO USE IN NOVA SCOTIA

## 2. Smoking Trends in Nova Scotia and Canada

Until recently, the epidemic of premature death, disease and disability due to smoking mainly affected the rich countries. With greater awareness of health impacts, however, smoking has declined in the rich countries in the last 30 years. Tobacco use is now on the rise in developing nations, with the number of smokers world-wide expected to rise from 1.1 billion today to 1.6 billion by 2025. The World Bank predicts that within 20 years, 70% of people killed by smoking will be in low and middle-income nations.[10]

The United States accounts for one-quarter of global cigarette exports, followed by the United Kingdom at 12%.[11] With sales declining in the rich countries, the tobacco industry, (and the GDP of cigarette-exporting countries,) depend increasingly on sales to the developing countries.

In the 1970s and early 1980s Canadians were the heaviest smokers in the world, consuming an average of 3,910 cigarettes per capita in 1970-72 and 3,800 cigarettes per capita in 1980-82, consumption rates not seen since in any country in the world. By 1990-92, due largely to sharp tax and price increases in the 1980s, per capita consumption in Canada had fallen to 2,540 cigarettes, and Canada had dropped from 1st to 13th rank in the world.[12]

In 1994, major tax cuts in five provinces dramatically slowed the continuing decline. Had the 1988-1993 nationwide trend continued at the same rate, 1998 consumption would have been 22% lower, (1,590 cigarettes per capita,) instead of the actual figure of 2,042.[13]

Smoking prevalence and consumption are both inversely related to both education and income. Those who did not finish high school are 60% more likely to smoke (29%) than university graduates (18%), consuming an average of 20 cigarettes per day compared to 16.[14] Those in the lowest income bracket are two and a half times as likely to smoke (38%) as those in the highest income bracket (15%).[15]

These trends mask significant differences among the Canadian provinces. Until recently, Quebec and Newfoundland had the highest smoking rates in the country. Today, according to the most recent *Canadian Tobacco Use Monitoring Survey* (Health Canada

[10] World Bank, op. cit., pages 1-2.
[11] World Health Organization, *Tobacco or Health: A Global Status Report*, World Health Organization, Geneva, 1997, Table 15, page 37.
[12] Ibid. Table 7, page 25.
[13] Canadian Cancer Society, *Surveying the Damage*, op. cit., pages 42-43.
[14] *CTUMS*, Table 4 and Fact Sheet 4 , pages 1-2. Note that the 1996-97 National Population Health Survey found the disproportion to be nearly three to one (39% less than high school; 14% university graduate): See Health Canada, *Statistical Report on the Health of Canadians*, 1999, pages 165 and 167.
[15] Health Canada, *Toward a Healthy Future: Second Report on the Health of Canadians*, 1999, page 119 and exhibit 5.7.

and Statistics Canada,) Nova Scotia ranks #1 in *both* smoking prevalence *and* daily cigarette consumption per smoker. [16]

In 1999, 29% of Nova Scotians 15 and older smoked, compared to 25% of Canadians, with Nova Scotian daily smokers consuming an average of 18.2 cigarettes daily, 7% more than other Canadians. Nova Scotian female smokers also smoke more heavily than women in any other province, with daily consumption 12% above the national average.

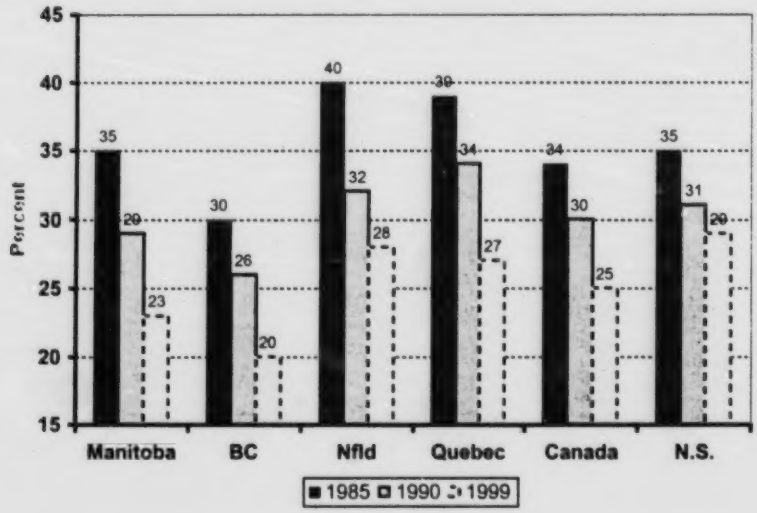
Since 1994, smoking prevalence in Nova Scotia has declined by less than 2%, compared to a 28% decline in Quebec, thus placing Nova Scotia for the first time ahead of Quebec as the province with the highest smoking rate.

Figure 1 compares Nova Scotia's rate of smoking decline with both the Canadian average, and with the four provinces that have had the fastest rate of smoking decline since 1985. The three Canadian provinces with the fastest rate of smoking decline all maintained high tobacco tax rates in 1994, at the same time that Nova Scotia lowered its cigarette tax dramatically. Newfoundland and British Columbia have the highest tobacco tax rates in the country.

Figure 1: Smoking Prevalence, 1985, 1990 and 1999, Canada and Selected Provinces

(Current smokers as percentage of population age 15 and over)

*(Ranked in order of Rate of Decline)*



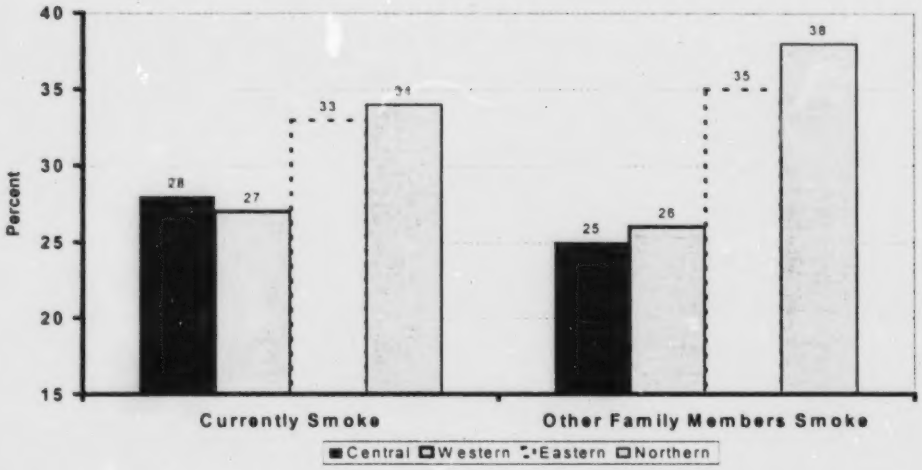

Sources: 1985 and 1990 Health Promotion Surveys; 1999 Canadian Tobacco Use Monitoring Survey, cited in CTUMS Fact Sheet 3, figure 3-2, and supplementary table 11.

The high Nova Scotia smoking rate masks major differences within the province. A 1995 Omnifacts Research Survey found that northern and eastern Nova Scotia (including Cape Breton) have smoking rates about 20% higher than western and central Nova Scotia

[16] *CTUMS*, op. cit., supplementary tables (esp. Table 11) and *Fact Sheets, Wave 1*, Figure 6-1.

(including Halifax and the Annapolis Valley.) In fact, the Halifax smoking rate is no higher than the national average, so the very high provincial rate results from high rates in two regions. Exposure of children to second-hand smoke may be 40% higher in Cape Breton than in Halifax (Figure 2).[17] This is important information, because it enables scarce tobacco control resources to be targeted where they are most needed.

Figure 2: Smoking Prevalence by Health Region, Nova Scotia, 1995




Because health risks and mortality from cigarette smoking are directly proportional to intensity and duration of consumption, any assessment of provincial tobacco costs must account for both smoking prevalence over time, and also quantity of consumption. On that count, the comparison with Manitoba is especially revealing. In each of the six years preceding the tax cut, Manitoba consistently had a higher per capita rate of cigarette consumption than Nova Scotia by an average of 7%. Since 1994, Nova Scotia's per capita cigarette consumption has been consistently higher than Manitoba's, by an average of 42%.18

Tobacco sales information provided by tobacco companies to Health Canada, and including sales of fine-cut tobacco as well as manufactured cigarettes, actually shows Nova Scotians with the highest per capita consumption of cigarettes as far back as 1996 and 1997.[19] In 1996, Nova Scotian per capita consumption for the population 15 and older was 2,529 cigarettes per capita and in 1997 it was 2,433 per capita, compared to a national average of 2,100. This indicates that Nova Scotia's top ranking for tobacco

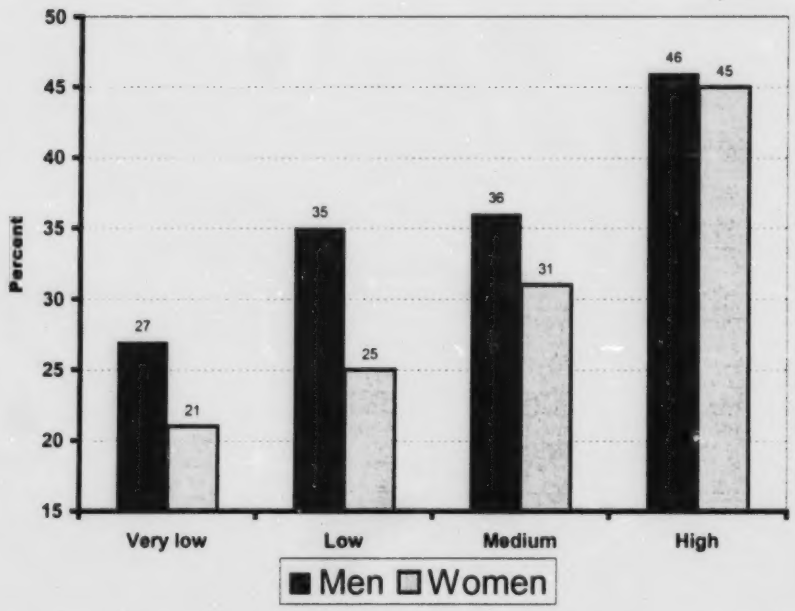
[17] Omnifacts Research Limited, *Smoking Ban in Public Places Public Opinion Survey*, #95155, September, 1995, supplied by Tobacco Control Unit, N.S. Department of Health.
[18] Canadian Cancer Society, *Surveying the Damage: Cut-Rate Tobacco Products and Public Health in the 1990s*, Ottawa, October, 1999, Appendix A, Table F, page 65
[19] Idem.

consumption may pre-date the top ranking for smoking prevalence shown in the official Statistics Canada surveys.

## *3. Smoking and Stress*

The 1994 National Population Health Survey found that 46% of Canadian men who experienced high levels of chronic stress were smokers, close to double the rate for men with a very low level of chronic stress (27%). The relationship was even more pronounced for women, whose smoking rates ranged from 21% among those with a very low stress level to 45% for those with high stress (Figure 3).[20]

Figure 3: Proportion of Population (18+) who are Smokers, By Level of Chronic Stress and Sex, Canada, 1994




Source: Statistics Canada, National Population Health Survey 1994-95

Though stress levels have been rising throughout the country, they have been rising at a faster rate in Nova Scotia, for reasons that are not yet well understood. In 1985, 14% fewer Nova Scotians reported high stress levels than other Canadians. By 1991, just 4% fewer Nova Scotians were highly stressed; and by 1994-95, *more* Nova Scotians were

[20] Statistics Canada, *National Population Health Survey Overview, 1994-95,* catalogue no. 82-567, pages 10-11.

chronically stressed than other Canadians. In the same year, 18% more Nova Scotians reported low levels of psychological well-being than other Canadians.[21]

The jump in female stress levels in Nova Scotia has been even sharper, with nearly one-third more Nova Scotian women reporting high stress levels in 1991 than in 1985. In 1985, female stress levels were 12% *below* the male level in Nova Scotia. By 1991, it was 29% *above* the male level. While the Nova Scotia figures are particularly dramatic, the pattern is reflected across the country, rising from 6% below male levels in 1985 to 20% above male levels in 1994-95.[22]

As noted in an earlier GPI report for Cancer Care Nova Scotia on costs of obesity, the increase in chronic stress, particularly among women, appears related to changing employment patterns. Seventy percent of families are now dual earners, and the combined burden of paid and unpaid work time is increasing across the country. Nova Scotian women have doubled their share of participation in the paid labour force from 27% forty years ago to 54% today, but still do most of the unpaid household work.

Working mothers now put in an average of 74 hours a week of paid and unpaid work, and working parents have an increasingly difficult time juggling the combined pressures of job and household responsibilities. Not surprisingly, Statistics Canada ranks 38% of working mothers as "severely time stressed" based on a 10-question time use survey. Women have 20% higher levels of time stress than men in every age group. However, the most recent figures in 1998 show that the gap may be narrowing. In the prime working-age group, 50% more men felt time-stressed in 1998 than in 1992, compared to one-third more women.[23]

In the 1996/97 National Population Health Survey, more women also reported high *work* stress levels than men in every age category. Women aged 20-24 were almost three times as likely to report high work stress than the average Canadian worker.[24]

A recent Statistics Canada study for the first time examined the relationship between work hours and smoking rates. After controlling for other factors, the study found that men who moved from standard to long hours were more than twice as likely to increase their rate of daily smoking compared to those working standard hours. Women moving to long hours were more than *four* times as likely to smoke more.[25]

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[21] Health Canada, *Statistical Report*, page 51; Statistics Canada, *Health Statistics 1999*, CD-ROM, Tables 00060139.IVT and 00060150.IVT.

[22] Idem.

[23] Colman, Ronald, *The Cost of Obesity in Nova Scotia*, Cancer Care Nova Scotia and GPI Atlantic, March 2000, Charts 12-15, pages 27-28; Statistics Canada, *The Daily*, November 9, 1999, page 2.

[24] Health Canada, *Toward a Healthy Future*, page 57.

[25] Shields, Margot, "Long Working Hours and Health," Statistics Canada, *Health Reports*, volume 11, no. 2, Autumn 1999, pages 33-48.

Smoking has also been linked to irregular work hours. Health Canada found that smokers are far more likely than non-smokers to work weekends, evening shifts, and night shifts. There is currently insufficient evidence to establish a causal relationship between work hours and smoking, but with employment patterns shifting in the last 20 years to higher rates of casual, on-call and temporary work, this correlation merits further study. Other indicators point to a clear relationship between smoking and job insecurity. Among all socio-demographic groups, current smoking prevalence is highest among the unemployed who are looking for work, at 46% overall and 52% for females.[26]

Since the relationship between stress and smoking is statistically confirmed for both sexes (Figure 3 above), it is essential to give attention to the deeper societal patterns that may be responsible for high smoking rates in Nova Scotia. Because patterns in changing work hours are not usually considered in tobacco control strategies, this evidence is presented here in somewhat expanded form in order to focus attention on some of the underlying social trends that may not be as amenable to conventional cessation-promotion activities.

There is an interesting sidebar to the relationship between smoking and stress. One study found that, while smoking withdrawal is undoubtedly stressful, "completely stopping smoking tends to lead to reduced stress, with stress increasing if smoking is resumed."[27]

## 4. Teenage Smoking

Concealed in the overall smoking trends described above is the dramatic increase in youth smoking rates since 1991. The 1998 Nova Scotia Student Drug Use Survey found a 40% increase in smoking among grade 7, 9, 10 and 12 students, up from 26% in 1991 to 36% in 1998. Eastern Health Region students (including Cape Breton) have the highest rate of smoking at 40%. The average age for first smoking a whole cigarette in Nova Scotia is 12.7 years. [28]

In the 1999 Canadian Tobacco Use Monitoring Survey, 31% of 15-19 year olds reported being current smokers. Among daily smokers, Nova Scotian youth smoke more heavily than their counterparts in any other province, consuming 15 cigarettes a day compared to 13 among Canadian 15-19 year-old daily smokers.[29] At today's rates, more than 65,000 of the children and teenagers alive in Nova Scotia today will become regular smokers. Of these, about 15,000 will be killed by their addiction in middle age, losing about 22 years of non-smoker life expectancy. A further 15,000 will die prematurely in later life.[30]

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[26] Health Canada, "Smoking on the Job: Trends and Issues," available at: http://www.hc-sc.gc.ca/hppb/tobacc...tions/workplace/work/wplcsmk02.htm
See also, Colman, Ronald, *Impact of Job Casualization on Canadian Workers,* GPI Atlantic, November, 1999, available from the GPI web site (publications) at www.gpiatlantic.org

[27] Townsend, Joy, Paul Roderick and Jacqueline Cooper, "Cigarette Smoking by Socioeconomic Group, Sex, and Age: Effects of price, income, and health publicity," *British Medical Journal,* volume 309, 8 October, 1994, page 927.

[28] Nova Scotia Department of Health, *Nova Scotia Student Drug Use 1998: Technical Report,* Dalhousie University Department of Community Health and Epidemiology, Halifax, 1998, page 17.

[29] *Canadian Tobacco Use Monitoring Survey,* Table 2.

[30] Extrapolations from Foulda, Jonathan and Christine Godfrey, "Counting the Costs of Children's Smoking," *British Medical Journal,* volume 311, 28 October, 1995.

Across the country, teenage smoking is rising at a faster rate among girls than boys. Between 1996 and 1999, smoking among 15-19 year-old Canadian men dropped from 40% to 28%, while it rose from 24% to 29% among 15-19 year-old women. Among daily smokers, teenage boys and girls now smoke the same amount. If current trends continue, teenage girls will soon consume more cigarettes per day than teenage boys.[31] In Nova Scotia, 38% of high school girls reported smoking in 1998 compared to 34% of boys.[32]

Surveys have found that stress relief and weight loss are the two primary reasons that teenage girls take up smoking; and that female students suffer from significantly higher stress levels than male students (Figures 4 and 5). Programs, brochures, materials and counseling that acknowledge these motivations explicitly are more likely to be effective than blanket statements about the health effects of smoking. The hypothesis of a relationship between rising stress levels and rising rates of smoking among teenage girls is highly plausible in light of earlier evidence associating smoking directly with chronic stress, particularly among women (see section 3 above). The relationship between smoking and weight is much less clear. Evidence demonstrates that the average weight gain for quitters is just 2.3 kg (5 pounds), undoubtedly a much smaller amount than many teenage girls imagine, especially when weighed against the health risks of smoking.[33]

[31] Stephens, Megan and Jason Siroonian, "Smoking Prevalence: Quit Attempts and Successes," Statistics Canada, *Health Reports*, volume 9, no. 4, Spring, 1998, page 33. 1999 teenage smoking rates are from *CTUMS*, Table 2. See also *CTUMS*, Fact Sheet 3 , Figure 3-3.

[32] *Nova Scotia Student Drug Use 1998*, op. cit., Table 15, page 17.

[33] Health Canada, *The Benefits of Quitting: Good News For Ex-Smokers*, Tobacco Education Fact Sheets, available at Health Canada web site: http://www.hc-sc.gc.ca/hppb/tobaccoeducation/factsheets/benefits.htm

Figure 4: "Severely Time-Stressed" Youth, 15-24, (%)[34]

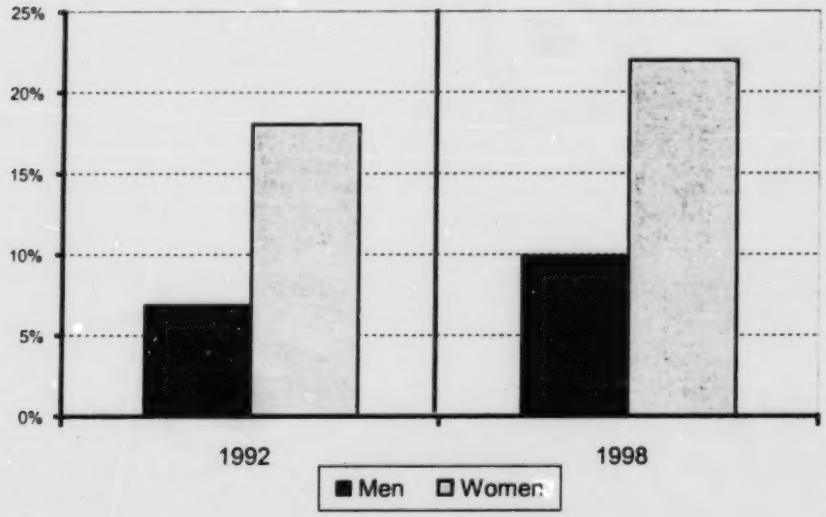
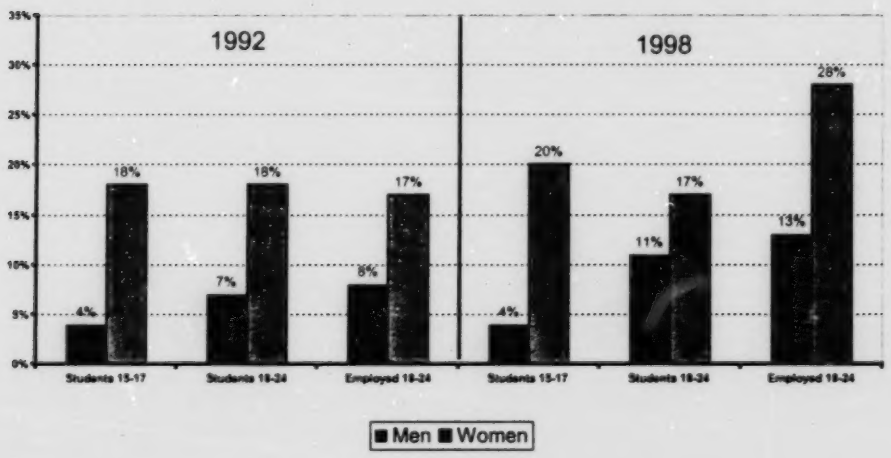



Figure 5: "Severely Time Stressed" Youth, by age and status (%)




[34] Respondents classified as "severely time stressed" by Statistics Canada are those that give affirmative answers to seven out of ten questions on a time stress questionnaire that includes questions like "Do you consider yourself a workaholic?", "Do you worry that you don't spend enough time with your family and friends?", and "Do you feel that you're constantly under stress trying to accomplish more than you can handle?"

1992 results from Statistics Canada, *As Time Goes By...Time Use of Canadians*, General Social Survey, by Judith Frederick, catalogue no. 89-544E, pages 15-16;

1998 results from Statistics Canada, *The Daily*, November 9, 1999, catalogue no. 11-001E, pages 2-4; and Statistics Canada, General Social Survey, Cycle 12, 1998, Housing, Family and Social Statistics Division, special tabulation.

Increases in time stress among youth since 1992 parallel tuition increases and rising student debt levels that may produce greater pressure to work longer hours while at school. Other stressors in the 90's include high youth unemployment rates, and job insecurity. These stresses affect both sexes and parallel increases in cigarette smoking during the same period for both young men and young women. But overall, young women are still more than twice as likely to be time-stressed as young men; and young women under18 are five times as likely to be squeezed for time.

More research is necessary to understand the links between teenage stress, weight concerns, and high rates of smoking among young women. But the issue is of particular concern in light of rising rates of lung cancer mortality among women (five times the rate of 30 years ago)[35], and recent findings that women smokers are more than twice as susceptible to lung cancer as men smokers. [36]

As the tobacco industry has long understood, teen smoking predicts adult behaviour. Among 21-39 year-old daily smokers, 86% began smoking as teenagers. Numerous studies have shown that the earlier people start to smoke the more cigarettes they will smoke and the less likely they are to quit.

Those who start smoking between 14 and 17 are 2.3 times as likely to smoke more than 20 cigarettes a day as those who start smoking at age 20 or more. Within 10 years, 42% of those who started smoking at age 20 or more had quit, compared to only 22% of those who started between 14 and 17, and just 18% of those who started smoking at 13 or less.[37] In short, rising rates of teenage smoking portend a serious and costly health crisis in the future.

New evidence, recently published in the British Medical Association Journal, *Tobacco Control,* shows that teenagers can become addicted to smoking much more quickly than previously thought, with some 12 and 13-year-olds showing evidence of addiction within days of their first cigarette. The researchers suggested that adolescents may be more sensitive to nicotine than those who start smoking at a later age.

The lead researcher in this study, Dr. Joseph Di Franzia of the University of Massachusetts, commented:

> *The really important implication of this study is that we have to warn kids that you can't just fool around with cigarettes or experiment with cigarettes for a few days and then give it up. If you fool around with cigarettes for a few weeks, you may be addicted for life.*[38]

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[35] National Cancer Institute of Canada, *Canadian Cancer Statistics 1999,* March 1999, page 9.

[36] *The Chronicle-Herald,* January 5, 2000, pages 1-2, reporting on study published in the *Journal of the U.S. National Cancer Institute* on Pennsylvania State University research findings on genetic susceptibility to lung cancer.

[37] Jiajian Chen and Wayne J. Millar, "Age of Smoking Initiation: Implications for Quitting," Statistics Canada, *Health Reports,* volume 9, no. 4, Spring 1998, pages 38-46.

[38] *The Halifax Daily News,* 12, Sept., 2000, page 13, "Teens can get addicted to nicotine early - study."

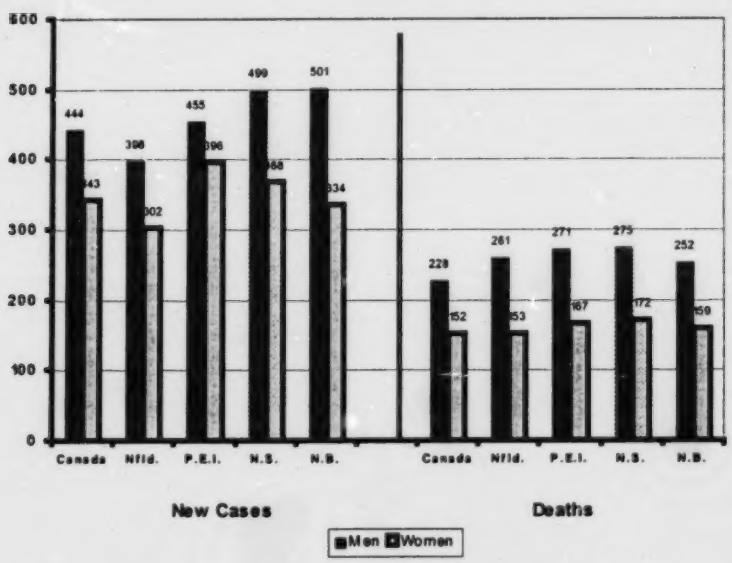
## 5. The Health Costs of Smoking

The health consequences of smoking are extremely well documented, and only a cursory review is needed here. Smoking is acknowledged as the most important preventable cause of death and illness in industrialized countries. Lung cancer is the most predictable outcome of smoking, although smoking also causes other cancers (oral, larynx, etc.). Smoking is also a significant risk factor for coronary heart disease, respiratory illness and hospitalization in general. The principal causes of death for smokers are cancer (41%) and heart disease (19%), followed by respiratory illness.[39]

Nova Scotia has the highest overall cancer death rates for both men and women in the country, 17% above the national average, and the highest incidence of lung cancer for women in the country, 15% above the national average. Lung cancer mortality among Nova Scotia men is 24% higher than the Canadian average (Figures 6 and 7). Ninety percent of lung cancers are attributable to smoking, and smokers are 22 times as likely to suffer from lung cancer as non-smokers.[40]

Figure 6: Cancer Incidence and Deaths, 1999: All Cancers

(Age-standardized rate per 100,000 population)

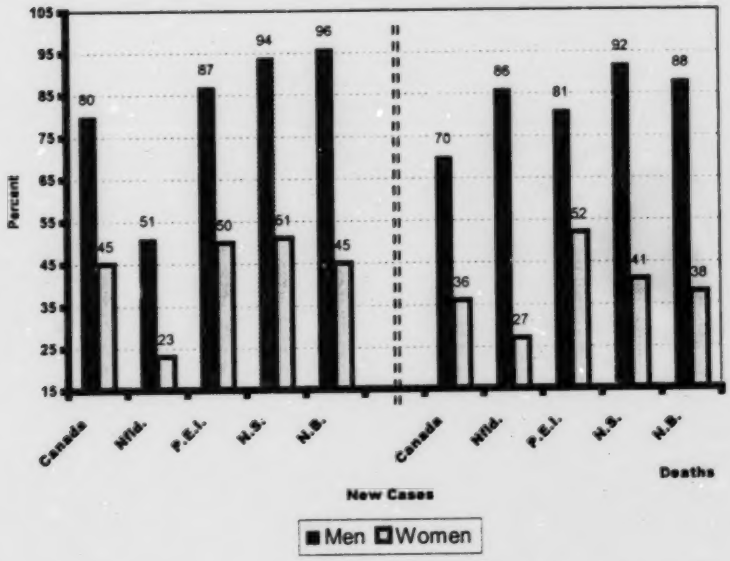



Source for Charts 5 and 6: National Cancer Institute of Canada, *Canadian Cancer Statistics 1999.*

[39] Health Canada, *Toward a Healthy Future: Second Report on the Health of Canadians,* 1999, page 25; Health Canada, *Statistical Report on the Health of Canadians*, 1999, page 308. It is noteworthy that other estimates, particularly from the United States have quite different proportions for smoking-attributable deaths. For example, the Office on Smoking and Health in the U.S. Centers for Disease Control and Prevention, July, 1996, estimates heart disease accounts for 32% of all smoking-related deaths, lung cancer for 28%, other cancers for 8%, chronic airway obstruction for 12%, and stroke for 6%. Pneumonia, bronchitis and emphysema account for another 8%. See http://www.cdc.gov/tobacco/mortali.htm

[40] National Cancer Institute of Canada, *Canadian Cancer Statistics, 2000,* Toronto, 2000, Tables 4 and 6, pages 20 and 22; for 1998 incidence and death rates see Health Canada, *Statistical Report,* pages 285-286; Health Canada, *Toward a Healthy Future,* page 22.

Figure 7: Lung Cancer Incidence and Deaths, 1999
(Age-standardized rate per 100,000 population)




Smoking is estimated to cost the country more than $10 billion annually in direct and indirect costs, with some estimates as high as $15 billion (see next section).[41] In Canada, smoking is estimated to be responsible for 45,000 deaths a year -- at least one-quarter of all deaths for adults between the ages of 35 and 84.

The health risks of smoking are measured not only by smoking incidence, but also by cigarette consumption and by nicotine dependence. As noted above, Nova Scotians smoke more heavily than other Canadians. This province also has the highest rate of nicotine dependence in the country, with 28% of daily smokers having their first cigarette *within five minutes* of waking in the morning, and 62% reaching for their first cigarette within half an hour of waking. With such high rates of nicotine addiction, it is not surprising that a smaller proportion of Nova Scotian smokers has considered quitting than the Canadian average.[42]

There are additional health concerns for women smokers. Pregnant women who smoke, or who are regularly exposed to second-hand smoke, put their babies at risk of miscarriage, stillbirth, premature birth, low birth weight, Sudden Infant Death Syndrome

[41] E. Single, L. Robson, X.Xie, et. al., *The Costs of Substance Abuse in Canada*, Canadian Centre on Substance Abuse, 1995, Table 4, and cited in Health Canada, *Statistical Report*, page 164. 1992 total adjusted here using the Statistics Canada *Consumer Price Indexes for Canada, CANSIM* database, Matrix 9957, Table P200000.
[42] Health Canada, *Statistical Report*, pages 168-170.

(SIDS), and respiratory problems that are exacerbated because infant lungs are large relative to body size.[43]

More than one-third of Canadian women under 40 who smoke daily also smoked during their last pregnancy despite the considerable health risks to new-born babies.[44]

In Nova Scotia, the overall rate of smoking during pregnancy is startlingly higher. A 1997 study found that 33.1% of pregnant women in Nova Scotia smoked before pregnancy. Of those, fully 70% continued to smoke throughout their pregnancy, and another 8.4% smoked up to the time of their first prenatal visit. Overall, 27.6% of all pregnant women in Nova Scotia smoked during pregnancy in 1997.[45]

The health risks of smoking are not confined to smokers. Environmental tobacco smoke ("second-hand smoke" or ETS) is also hazardous. Young children are particularly susceptible to the effects of ETS, with increased risks of developing asthma, respiratory illness, reduced lung development, middle ear infection and a variety of other conditions, as well as increased risks of later smoking and nicotine dependence.[46]

Second-hand smoke is the third largest cause of lung cancer, with up to one-quarter of lung cancer deaths attributable to second-hand smoke. On average, ETS levels in restaurants are up to two times as high as in office workplaces, and in bars up to six times as high. Bar workers are exposed to 4.5 times the ETS level as in residences with smokers. Not surprisingly, food service workers have a 50% higher risk of lung cancer than the general population.[47] Second-hand smoke also increases the risk of death from heart disease by 20-30% for nonsmokers married to smokers. Working in a smoke-filled environment has about the same long-term health effect as smoking ten cigarettes a day.[48]

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[43] Ibid., page 164; N.S. Department of Health, *Smoke-Free Places: Towards Healthier Communities in Nova Scotia; A Discussion Paper,* page 3.

[44] Health Canada, *Statistical Report,* pages 164-167

[45] Kirkland, Susan, Linda Dodds, and Gerry Brosky, "The Natural History of Smoking During Pregnancy among Women in Nova Scotia," *Canadian Medical Association Journal,* 2000; 163 (3), August 8, 2000, pages 281-2; N.S. Atlee Perinatal Database 1999, cited in N.S. Department of Health, Tobacco Control Unit, *Supporting a Nova Scotia Comprehensive Tobacco Strategy That Works,* February, 2000.

[46] Health Canada, *Statistical Report,* page 65.

[47] Health Canada, "Smoking on the Job: Trends and Issues," available at: http://www.hc-sc.gc.ca/hppb/tobacc...tions/workplace/work/wplcsmk02.htm

[48] Nova Scotia Department of Health, *Smoke-Free Places: Towards Healthier Communities in Nova Scotia: A Discussion Paper,* pages 3-4, citing sources from the Heart and Stroke Foundation, *Journal of the American Medical Association,* and *Canadian Medical Association Journal,* (footnotes 1, 2, 8, and 9, p. 4).

# PART 2: ECONOMIC COSTS OF SMOKING AND BENEFITS OF CESSATION[49]

## 6. Economic Costs of Smoking in Nova Scotia

Costs to health and life translate into economic costs. In the U.S., for example, the average male smoker was found to utilize 63% more hospital bed days per year, and to have 19% more physician visits per year compared with a non-smoker.[50] In addition to such "direct" costs paid by the taxpayer, smoking also produces "indirect" costs to the economy through productivity losses due to higher rates of premature mortality, disability and absenteeism among smokers.

The World Bank found that smoking-related health care in high-income countries accounts for between 6 and 15 percent of all annual health care costs. Applied to Nova Scotia's $1.7 billion health care budget, the World Bank estimate would translate into $102 - $255 million annually.[51] Based on this range, the N.S. Department of Health Tobacco Control Unit has estimated a mid-range cost of $170 million in direct smoking-attributable costs to the Nova Scotia health care system.[52]

In the only study to have made explicit provincial estimates, the Canadian Centre on Substance Abuse (CCSA) estimated the 1992 costs of tobacco for Nova Scotia at $101.3 million in direct health care costs, $1.9 million in other direct costs, and $298 million. According to the CCSA estimate, total economic costs of tobacco to Nova Scotia are therefore $401 million (converted to $1999), equivalent to 2% of provincial GDP.[53]

The health care costs here are just 6% of the Nova Scotia health care budget, at the very lowest end of the World Bank estimate for high-income countries. This may be explained in part by the fact that the CCSA estimate deliberately adopted a conservative approach to estimation, using low estimates whenever data were incomplete of when alternative sources yielded different figures.[54]

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[49] Note that throughout this report, all values are translated into 1999 Canadian dollars, using Statistics Canada's Consumer Price Indexes for Canada and for Nova Scotia. Where appropriate, specific consumer price indexes for health care and for tobacco products are used rather than the "all items" index, which is used mainly to assess the productivity losses due to smoking-attributable premature mortality.

[50] Phillips, David, Ichiro Kawachi and Murry Tilyard, "The Economics of Smoking: An Overview of the International and New Zealand Literature," *PharmacoEconomics* 3 (6), 1993, page 465.

[51] World Bank, op. cit., page 4.

[52] N.S. Department of Health, *Supporting a Nova Scotia Comprehensive Tobacco Strategy that Works*, February, 2000.

[53] Eric Single, Lynda Robson, Xiaodi Xie and Jurgen Rehm, *The Costs of Substance Abuse in Canada*, Canadian Centre on Substance Abuse, 1996, Table 12 (hereafter CCSA). Estimates are adjusted to 1999 values using Statistics Canada's Consumer Price Index for health care, *CANSIM* database Matrix no. 9960, table P203085 for direct health care costs, and the Consumer Price Index for all items, ibid. table P203000 for indirect costs.

[54] CCSA, page 1.

In addition, the CCSA estimate omitted some key health care categories, including long-term care costs for infants born with disabilities due to smoking, and treatment costs of infants and children affected by second-hand smoke, including asthma and other respiratory ailments. Indeed, the only environmental tobacco smoke cost included in the CCSA estimate is for lung cancer. Thus, for example, only 167 smoking-attributable hospital days in total (less than half a year) are assigned for all Nova Scotia children age 0-14, an estimate contradicted by the epidemiological evidence on second-hand smoke.[55] One U.S. study found that including the costs of passive smoking doubled the social costs imposed by smoking.[56]

Table 1 summarizes the CCSA cost estimates for Nova Scotia and Canada, adjusted to 1999 dollars. It is noteworthy that the Nova Scotia per capita cost of smoking ($439) is the highest of any province. Similarly, Nova Scotia's rates of mortality, potential years of life lost, and hospitalizations due to smoking are all the highest in Canada.

The CCSA study also excludes residential care. A 1991 Canadian study by Murray Kaiserman of Health Canada's Office of Tobacco Control found that smoking-attributable residential care added $1.7 billion to the bill ($1999). The same study found that smoking-attributable fires caused $90 million in damages compared to the $19 million estimated by CCSA and estimated total smoking attributable costs in Canada at $17 billion even after adjusting for $1.7 billion in "savings" to the health care system from the premature deaths of smokers. In other words, this Health Canada study yields total cost estimates that are 60% higher than the CCSA estimate.[57]

The CCSA's *indirect* cost estimate also excluded some important categories, including on-the-job productivity losses and other workplace costs, which are considered below. However, those additional costs will have a smaller impact on the total CCSA cost estimate, as productivity losses due to premature mortality (included in the CCSA estimate) are by far the largest constituent of indirect costs.

Some upward adjustment to the CCSA estimate for health care costs is therefore probably necessary, both due to the conservative assessment methods used by the CCSA, and in order to include some cost categories omitted in the CCSA estimate. It is highly unlikely that Nova Scotia, with the country's highest smoking and cancer rates, would have smoking-attributable health care costs at the very lowest end of the World Bank assessment for high-income countries.

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[55] CCSA, Table B62: "Hospital Days due to Morbidity Associated with Tobacco, by Cause, Age and Gender, Nova Scotia, 1992."

[56] Manning, Willard, Emmett Keeler, and Joseph Newhouse, "The Taxes of Sin: Do Smokers and Drinkers Pay Their Way?", *Journal of the American Medical Association,* March 17, 1989, volume 261, no. 11, pages 1604-1609.

[57] Murray J. Kaiserman, "The Cost of Smoking in Canada, 1991," *Chronic Diseases in Canada,* volume 18, no. 1, 1997, Health Canada, Health Protection Branch, Laboratory Centre for Disease Control, Ottawa. All cost estimates are translated into $1999. Kaiserman notes that this study is the first in Canada to estimate the smoking-attributable cost of residential care. Available on the Health Canada web site at http://www.hc-sc.gc.ca/hpb/lcdc/publicat/cdic/cdic181/cdic181c_e.html

Table 1: Costs of Tobacco in Canada and Nova Scotia
($1999 millions)

(Rates per 100,000 population, rows 1-4, are in parantheses)

| | Canada | | Nova Scotia | |
|---|---|---|---|---|
| Deaths | 33,496 | (118) | 1,417 | (154) |
| Potential years of life lost | 495,640 | (1,743) | 20,312 | (2,206) |
| Hospitalizations | 206,095 | (732) | 9,932 | (1,079) |
| Hospital Days | 3,024,265 | (10,635) | 106,416 | (11,554) |
| ***Direct Health Care Costs** ($1999 millions)* | | | | |
| Hospitals | | 1968.5 | | 78.24 |
| Ambulance Services | | 64.2 | | 1.43 |
| Physician fees | | 381.4 | | 7.78 |
| Prescription Drugs | | 513.5 | | 16.39 |
| Other Health Care Costs | | 76.8 | | 1.32 |
| **Total Direct Health Care Costs** | | **3,004.6** | | **105.16** |
| ***Other Direct Costs** ($1999 millions)* | | | | |
| Fire damage | | 18.9 | | 0.51 |
| Workplace tobacco cessation programs | | 0.4 | | 0.01 |
| Research | | 38.2 | | 1.21 |
| Prevention programs | | 14.8 | | 0.20 |
| ***Indirect Costs** ($1999 millions)* | | | | |
| Productivity loss (sickness) | | 93.4 | | 3.73 |
| Productivity loss (mortality) 6% discount rate | | 7441.4 | | 294.34 |
| **TOTAL** | | **10,563.6** | | **404.82** |
| Total as % of GDP | | 1.39% | | 2.06% |
| **Total per capita** | | **$371.3** | | **$439** |

Source: Canadian Centre for Substance Abuse, *The Costs of Substance Abuse in Canada.* All costs are adjusted from 1992 to 1999 dollars using the Canada and Nova Scotia Consumer Price Index for "health care" for health care costs, and for "all items" for all other costs.

Because the CCSA estimate appears to be lower than comparable estimates, a closer look at some health care cost categories seems warranted, as above, as well as a comparison with cost estimates by other authorities.

### 6.1 Comparative Estimates of Smoking-Attributable Mortality

A further indication that the CCSA estimate is low is that its assessment of smoking-attributable mortality is considerably lower than all other comparable estimates. As productivity losses due to premature mortality are the largest cost component, any underestimate of smoking attributable deaths will considerably lower the overall economic cost estimate.

Health Canada attributed 41,408 deaths to smoking in 1991, 24% more than the CCSA estimate. According to Health Canada, 21% of all deaths in Canada were attributable to

smoking in 1991, considerably higher than the CCSA estimate of 17%. For the Atlantic region, Health Canada estimated that 3,934 deaths were attributable to smoking. Assuming the same smoking-attributable mortality rate in all four Atlantic provinces, this would produce 1,531 Nova Scotia deaths due to smoking, rather than the 1,417 estimated by CCSA.[58]

A more recent study by researchers in Health Canada's Laboratory Centre for Disease Control produced an even higher estimate of 45,000 deaths in Canada in 1991 caused by smoking, more than one-third higher than the CCSA estimate.[59] The study found that one-third of current male smokers and one-quarter of current female smokers were expected to die before age 70, more than double the rate of premature death among non-smokers.

A 1999 Health Canada study, using data from the National Population Health Surveys and the Canadian Mortality Database, estimated that smoking killed 45,472 Canadians in 1994, and 45,215 in 1996. Of the increase of 3,807 deaths since 1991, two-thirds occurred in women. In 1994, 4,530 Atlantic Canadians died as a result of smoking. In 1996, smoking killed 4,305 Atlantic Canadians.[60]

This means that about 1,764 Nova Scotians died from smoking in 1994, and 1,676 died in 1996 due to smoking. This is 24% higher than the CCSA estimate for 1994 and 18% higher for 1996. It also indicates that the number of 1,400 Nova Scotian deaths due to tobacco, posted in tobacco retail outlets, is an underestimate. If 20-21% of all deaths in Nova Scotia are attributable to smoking, as Health Canada studies indicate, then 1,674-1,757 of the 8,368 deaths in Nova Scotia in 1999 are attributable to smoking.[61]

Earlier Health Canada studies confirm these higher estimates -- 37,531 Canadians died due to tobacco use in 1985, and 38,357 died due to smoking in 1989. The same study found that 20% of all deaths in Canada in 1989 were due to smoking.[62] A follow-up study by region found that smoking killed 3,625 Atlantic Canadians in 1989.[63]

If smoking killed Nova Scotians at the same rate as other Atlantic Canadians, this means that 1,412 Nova Scotians died from smoking in 1989. It should be noted here that the CCSA found that the Nova Scotia mortality rate due to smoking was 38% higher than

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[58] Health Canada, "Deaths in Canada Due to Smoking," November, 1996, available at http://www.hc-sc.gc.ca'english/archives/96-97/deathe.htm

[59] Ellison, Larry, Howard Morrison, Margaret de Groh and Paul Villeneuve, "Health Consequences of Smoking among Canadian Smokers: An Update," *Chronic Diseases in Canada,* volume 20, no. 1, 1999, available at http://www.hc-sc.gc.ca/hpb/lcdc/publicat/cdic/cdic201/cd201f_e.html

[60] Makomaski Illing, Eva, and Murray Kaiserman, "Mortality Attributable to Tobacco Use in Canada and its Regions, 1994 and 1996, *Chronic Diseases in Canada,* volume 20, no. 3, 1999, Health Canada, pages 111-117.

[61] Deaths from Statistics Canada, *CANSIM* database, Matrix 5, Table D160, "Deaths in Canada, by Province and Territory, Nova Scotia."

[62] Collishaw, Neil and Keith Leahy, "Mortality Attributable to Tobacco Use in Canada, 1989," *Chronic Diseases in Canada,* July-August, 1991, Health Canada, pages 46-49.

[63] Morin, Margaret, Murray Kaiserman and Keith Leahy, "Regional Mortality Attributable to Tobacco Use in Canada, 1989," *Chronic Diseases in Canada,* Volume 13, no. 4, July-August, 1992, Health Canada, pages 64-67.

that in Newfoundland and 18% higher than that in New Brunswick. With those adjustments, it is likely that 1,600 Nova Scotians a year were already dying from smoking ten years ago.

With smoking deaths climbing into the 1990's, the weight of historical evidence therefore confirms the more recent studies and indicates that Nova Scotia smoking deaths today are closer to 1,600-1,700 than to 1,400. Adjusting the CCSA estimate to account for these higher assessments would raise the economic cost estimate to the mid-range of World Bank calculations for high-income countries, and yield a provincial smoking-attributable health care cost closer to $160 million a year.

One prospective Health Canada study in 1995 forecast smoking mortality by province for the year 2000 based on past trends in smoking prevalence and mortality. That study found 1,693 smoking-attributable deaths in Nova Scotia in 1991 out of 45,065 for Canada as a whole (3.8% of the total when the Nova Scotia population was 3.3% of the total). Based on past smoking trends, the researchers forecast 1,628 smoking-related deaths for Nova Scotia for the year 2000 out of a predicted 46,910 for Canada as a whole (3.5% of the total compared to a population that is 3% of the total).[64]

In sum, all the evidence points to smoking-attributable mortality at least 20% higher than the CCSA estimate for Nova Scotia. It further indicates that the CCSA health and productivity cost assessments for the province are likely underestimated, and that the N.S. Department of Health's Tobacco Control Unit estimate of $170 million (at the mid-range of World Bank estimates) is probably reasonably accurate. It also points to the need to revise the current public posters at tobacco outlets upward to indicate that smoking kills more than 1,600 Nova Scotians a year, rather than the 1,400 now indicated.

### 6.2 Alternative Medical Care Cost Estimates

A very thorough review of the international literature on the economics of smoking by Phillips et. al. led the authors to refine and recalculate many medical care costs more precisely. They estimated that excess medical care expenditure due to smoking amounted to about 7% of total state expenditure on healthcare in New Zealand.[65]

Applying the New Zealand estimate to Nova Scotia would yield a cost estimate of about $120 million a year in public health care costs. The most recent estimates from the Canadian Institute for Health Information are that private health expenditures account for 29% of total health care spending in Canada.[66] Applying that ratio to smoking-attributable illness in Nova Scotia would add another $48 million to smoking-attributable health care costs in the province, for a total of $168 million. That is very close to the

[64] Ellison, Larry, Yang Mao and Laurie Gibbons, "Projected Smoking-attributable Mortality in Canada, 1991-2000, *Chronic Diseases in Canada,* volume 16, no. 2, spring 1995, Health Canada, Health Protection Branch, Laboratory Centre for Disease Control, Tables 4 and 5.

[65] Phillips, et. al., "The Economics of Smoking," page 462

[66] Canadian Institute for Health Information, "How Canada Compares: Health Expenditures per person by the private and public sectors in 1997 for G7 countries, after adjusting for differences in prices (purchasing power) between countries," on the CIHI web site at http://www.cihi.ca/roadmap/health_reo/healthreport2000/report/fig11.htm

$170 million estimate of the N.S. Health Department's Tobacco Control Unit, and exactly in the mid-range of the World Bank's estimate for high-income countries.

Table 2 summarizes medical care costs of cigarette smoking as calculated in various studies. Costs per smoker reflect smoking rates in year of study. Phillips' review of the international literature attributes the wide discrepancy between the different estimates to:

- Inclusion of different cost items in the analyses (e.g. Kaiserman's inclusion of smoking-attributable residential care).
- Discrepancies in diseases considered smoking-related (e.g. Some studies consider only lung cancer, heart disease, and chronic obstructive pulmonary disease.)
- Use of different relative risk and smoking prevalence estimates in calculating the proportion of mortality and morbidity attributed to smoking.
- Different estimates for the cost of treating illness (e.g. higher health care costs in the U.S.A., and increasing health care costs over time.)
- Whether or not the "life cycle" approach was adopted in the calculation of costs (See 6.3 below).[67]

Table 2: Alternative Estimates of Medical Care Costs of Smoking ($CAN1999)

| Reference | Country | Total Cost ($ millions) | Cost per smoker/year |
|---|---|---|---|
| Single (CCSA) (1992) (Canada estimate) | Canada | 3,005 | 383 |
| Single (CCSA) (1992) (Nova Scotia) | Canada | 105 | 378 |
| Kaiserman (1991) (incl. residential care) | Canada | 4,487 | 572 |
| Stoddart et.al. (1986) | Canada | 679 | 254 |
| Collishaw & Myers (1984) | Canada | 3,260 | 326 |
| Thompson and Forbes (1982) | Canada | 6,060 | 600 |
| Leu and Shaub (1984) | Switzerland | 154 | 82 |
| Dept. Health & Social Security (1972) | U.K. | 1,650 | 106 |
| Kristein (1977) | U.S.A. | 24,358 | 1107 |
| Luce & Schweitzer (1978) | U.S.A. | 36 | 594 |
| US Office of Technology Assessment (1985) (mid-range estimate) | U.S.A. | 49,335 | 988 |
| Phillips et. al. (1992) | N.Z. | 201 | 419 |
| Phillips et. al. (1993) | N.Z. | 163 | 324 |

Source: CCSA (Table 1); Kaiserman, *The Cost of Smoking in Canada, 1991;* and Phillips et. al., 1993, "The Economics of Smoking," pages 462-4.[68]

[67] Phillips, et. al., "The Economics of Smoking", 1993, page 464.

[68] Most of these estimates are cited by Phillips from Markandaya A, and D.W. Pearce, "The Social Costs of Tobacco Smoking," *British Journal of Addiction,* 84: 1139-1150, 1989.

### 6.3 The Life-Cycle Approach

The "life cycle" approach is highly controversial, and explains the very low cost per smoker estimate in the Swiss study by Leu and Schaub above. A 1997 New England Journal of Medicine article (Barendregt et. al.) also uses the life cycle approach to argue that "smoking cessation would lead to increased health care costs" because the premature deaths of smokers save the health care system money in the long run.[69] In other words, because old people use the health care system more, and because so many smokers die young, smokers are actually less expensive than non-smokers living to old age.

Phillips (1993) reports an increasing trend in the literature to balance excess medical care costs incurred by smokers against future 'savings' resulting from premature death.[70] We have already noted that Kaiserman's 1991 Canadian study discounted a total smoking-attributable cost estimate of $18.5 billion by $1.7 billion to account for 'savings' from smokers' premature deaths.[71]

The Mississippi Attorney-General, characterized use of this argument by the tobacco industry to claim a credit against State lawsuits for recovery of medical care costs as "ghoulish:"

> *It is selling death as a benefit. This is offensive to human decency, an affront to justice, and uncharacteristic of civilized society. The industry should not be rewarded for relieving the State of the burden of caring for many of its elderly citizens. It is not doing the State a favor by killing smokers early and saving the State money; and the amounts the State seeks in restitution should not be reduced by such grizzly 'savings.'*[72]

The controversy over this approach actually illustrates the limitations of cost-benefit analysis altogether, which can never be used as a substitute for establishing fundamental values, directions and goals. In other words, society must decide whether it values life itself and having its elderly citizens cared for in their old age. If our only goal is to save money, as industry use of the life-cycle analysis implies, we should kill all old people before they become costly to the health care system. The argument that premature deaths are cost-effective should not apply only to smokers.

Life cycle analysis *can* validly be used to calculate a smoker's total costs to the health care system over his or her life-time compared to the same costs accrued by the non-smoker over the same period of time. Indeed life-cycle analysis is the only valid approach to calculate the economic benefits of cessation, which accrue gradually over time. But a life-cycle approach cannot validly be used to *compare* total life-time costs of smokers with total life-time costs of non-smokers, because it makes no sense to compare the costs

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[69] Barendregt, Jan, Luc Bonneux, and Paul van der Maas, "The Health Care Costs of Smoking," *The New England Journal of Medicine*, 1997; 337; pages 1052-1057.
[70] Phillips, et. al., "The Economics of Smoking," 1993, pages 464-5.
[71] Kaiserman, "The Cost of Smoking in Canada, 1991," pages 1 and 5.
[72] Moore, Michael JD and Charles Mikhail JD, "A New Attack on Smoking: Using an Old-time Remedy," *Public Health Reports*, May-June, 1996, volume 111, page 201.

and benefits of dead people to those of live people. The comparison is only valid during each year of life and at each age.

In other words, it is valid to compare the economic costs of live smokers and live non-smokers at any given age. But, as the Mississippi Attorney-General points out, it is literally uncivilized for any society that values life at any age to compare the health care costs of dead smokers with those of live non-smokers, and to characterize the former as "savings" or "benefits" in a cost-benefit analysis. This point needs to be emphasized here both in light of the growing trend in academic analysis to discount tobacco costs by premature death "savings," and particularly by tobacco industry misuse of life-cycle analysis to claim credits for health care savings in damage recovery lawsuits.

### 6.4 The Costs of Employing a Smoker in Nova Scotia

We have considered upward adjustments that may be necessary to the CCSA cost estimate for Nova Scotia, based on omitted costs for some health care categories and for residential care, as well as on underestimates of smoking-attributable mortality and morbidity. Among the indirect cost estimates, the CCSA estimate also does not include on-the-job productivity losses that have been assessed since the CCSA study was released.

Studies in both Canada and the United States have estimated that smokers lose an additional half hour per day of productive work time compared to non-smokers, taking an average of three ten-minute smoke breaks beyond normal, scheduled breaks. The U.S. study considered this a "minimum" estimate, and did not include time spent getting to and from smoking areas.[73]

If one-third of the Nova Scotian daily smoker's average of 18.2 cigarettes per day are consumed during work hours, and if three of those six work-time cigarettes are consumed during scheduled breaks, then three more, on average, are consumed during unscheduled breaks. Assuming a 227-day work year (allowing for weekends plus 3 weeks of vacation, 10 statutory holidays, and 9 sick days), the average Nova Scotia smoker loses 113.5 hours per year of work-time due to unscheduled smoke breaks.

Based on current average weekly earnings in Nova Scotia ($511.80 per week), and adding mandatory employer payroll tax and benefit costs of 15% (including Employment Insurance, Canada Pension Plan and Workers' Compensation Plan costs), the average smoking employee costs his employer $1,908 extra per year in lost daily work-time. This

[73] Data in this section are based on two studies by The Conference Board of Canada, *Smoking and The Bottom Line: The Costs of Smoking in the Workplace,* Health Canada, Ottawa, 1997,and *Smoking Cessation Initiatives in the Workplace,* available on the Health Canada web site: http://www.hc-sc.gc.ca/hppb/tobaccoreduction/publications/workplace/bottom_line/report.htm and also on a study prepared for the U.S. Department of Defense: Helyer, Alan and Walter Brehm, "The Economic Consequences of Tobacco Use for the Department of Defense, 1995," *Military Medicine,* volume 163, no. 4, April, 1998, pages 217-221. A related study of Telecom Australia employees that estimated shorter smoke breaks but higher sick leave rates is: Hocking, Bruce, Heather Grain and Ian Gordon, "Cost to Industry of Illnesses Related to Alcohol and Smoking: A Study of Telecom Australia Employees," *The Medical Journal of Australia,* volume 161, 3 October, 1994, pages 407-412.

is lower than the $2,306 national average estimated by the Conference Board of Canada, and reflects the lower average industrial wage in Nova Scotia.[74]

From the point of view of the economy as a whole, this loss is actually considerably greater because wages represent only a portion of the value of the worker's actual output or economic production. To gauge the actual economic loss sustained by smoking workers' excess smoke-breaks, the Nova Scotia GDP is divided by employment figures to obtain the real hourly GDP per person at work. From this perspective the actual value of lost production per smoking employee is 72% higher, or $3,290 a year.

Statistics Canada surveys indicate that smoking prevalence in the labour force is 9% higher than the national average.[75] However, when the very high number of unemployed smokers is subtracted from the labour force average, smoking prevalence among employed workers is similar to the national average.

Of 420,000 Nova Scotian employees, a 28.7% smoking rate yields about 121,000 smoking employees. Adjusting for an 80%-20% full-time/part-time ratio, it is estimated that unscheduled smoke-breaks cost Nova Scotia employers $208 million a year in lost wages, while the economy loses $358 million in foregone production, equivalent to 1.8% of GDP.[76]

As is apparent, these on-the-job productivity losses due to smoking can be enormous, almost equal to the total annual cost of smoking as calculated by the Canadian Centre on Substance Abuse. These losses are not included in any standard assessment of the economic costs of smoking.

If Nova Scotian smokers reduced their on-the-job cigarette consumption and unscheduled smoke breaks by half, they would contribute 6.2 million extra productive hours per year to the economy, at a value of $104 million to their employers and $180 million to the economy.

Workplace restrictions on smoking are almost always assessed for their benefits in reducing environmental tobacco smoke and protecting non-smoking employees from the negative health impacts of second-hand smoke. But they can also save money in other ways.

Evidence shows that daily smokers who work in smoke-free environments consume four fewer cigarettes per day during work hours than those who have no restrictions on smoking at work. Since the Conference Board of Canada, and U.S. Defense Department

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[74] Conference Board of Canada estimates are adjusted to $1999 using Statistics Canada's "all items" Consumer Price Index for Canada. Average weekly earnings for all employees for Nova Scotia and Canada are from Statistics Canada, "Employment, Earnings and Hours," *The Daily*, April 27, 2000, and from Statistics Canada, *Employment, Earnings and Hours*, catalogue no. 72-002-XPB.

[75] Health Canada, "Smoking on the Job: Trends and Issues," available on the Health Canada web site at: http://www.hc-sc.gc.ca/hppb/tobacc...tions/workplace/work/wplcsmk02.htm

[76] Employment figures are from Statistics Canada, "Employment, Earnings and Hours," as above; the full-time/part-time ratio in Nova Scotia is calculated from the labour force statistics in the *Nova Scotia Statistical Review 1999*, Nova Scotia Department of Finance, Statistics Division, December, 1999, page 20.

estimates of work-time losses due to smoke breaks are based on just three excess cigarettes per day, it is clear that complete workplace smoke bans could virtually eliminate this enormous cost burden currently borne by employers and the economy.

Clearly, the provision of smoking rooms will not solve the problem. In fact, the Conference Board of Canada study shows that they can *increase* employer costs. Aside from the estimated cost of providing and cleaning properly ventilated smoking areas, estimated at $90 per smoking employee per year (in $1999), the Conference Board estimated an average of 10 minutes travel time per day for smokers to and from the smoking areas. In other words, it may be cheaper for smokers to smoke at their work stations than to provide smoking areas. Only a total smoking ban in the work place will eliminate the current cost of smoke breaks.

Both the U.S. and Canadian studies have estimated additional employer costs incurred due to excess absenteeism by smokers caused by smoking-related illnesses. Statistics Canada's 1994 General Social Survey found that smokers are absent 1.8 days per year more than non-smokers.

Again using the average Nova Scotia industrial wage, each smoker costs his/her employer an additional $202 a year in excess absenteeism for a total cost of $22 million to Nova Scotia employers and $38 million in lost production value. In terms of total productive time lost, smokers' higher rates of absenteeism cost the Nova Scotia economy nearly 200,000 person-days a year, or 865 person-years of work-time annually.

It should be noted that these costs *are* included in the CCSA estimate of indirect costs due to smoking related illnesses (though assessed at the lower wage cost rather than the higher production value cost). What is unique about the Conference Board study, however, is that it assesses the costs of employing a smoker from the perspective of the *employer* rather than of society as a whole. In other words, these are actually incremental costs to the business itself that reduce profit margins and undermine competitiveness.

The final cost category considered in the Conference Board of Canada study is the employer share of increased life insurance premiums, amounting to $80 per smoking employee per year. Insurance companies give an average 35% discount to non-smokers to reflect their lower sickness and disability rates and their increased life expectancy relative to smokers. A firm that hired only non-smokers might negotiate a similar discount for group life insurance plans currently paid for by many employers.

Table 3 summarizes the annual excess cost of employing smokers for Nova Scotia employers and for the Nova Scotia economy as a whole. From the positive side, these costs can be regarded as the potential *savings*, and *added value* to the economy, that could be realized from a total workplace smoking ban.

Needless to say, the potential savings in Table 3 do not include the enormous health and productivity savings that would be realized from a reduction in second-hand smoke impacts or from reduced smoking prevalence and consumption among current smokers. It is estimated that 80% of a non-smoker's exposure to environmental tobacco smoke occurs in the workplace, so workplace smoking bans can drastically reduce the incidence

of lung cancer, heart disease and respiratory problems suffered by non-smokers due to second-hand smoke.[77] As well, it is likely that workplace smoke bans, and increased employer awareness of the costs of hiring smokers, may reduce smoking just as price increases do (see section 9 below), as they potentially threaten the livelihood security of smokers.

Table 3: Annual Extra Cost of Employing a Smoker in Nova Scotia, compared to a Non-smoker ($1999)

| Cost Factor | Cost per employee | Cost to NS employers | Lost production value (NS economy) |
|---|---|---|---|
| Increased absenteeism | $202 | $22 million | $38 million |
| On-the-job productivity losses | $1,908 | $208 million | $358 million |
| Increased life insurance premiums | $80 | $9 million | |
| Smoking area costs | $90 | $10 million | |
| **TOTAL** | **$2,280** | **$249 million** | **$396 million** |

Source: Adapted from The Conference Board of Canada, *Smoking and the Bottom Line.*

### 6.5 Avoidable Costs

In closing this chapter, it is necessary to emphasize the obvious -- that the sickness, death and economic losses caused by tobacco smoking are entirely preventable. As stated in one of the most comprehensive reviews of the economics of smoking:

> *The excess costs associated with smoking represent avoidable costs, and hence a deadweight loss to society both in monetary and human terms.*[78]

The chapters that follow, and the remaining two-thirds of this study focus on how those costs may be avoided in Nova Scotia.

## 7. Potential Cost Savings to Nova Scotia from Smoking Less

By combining the provincial prevalence data with the per capita consumption data in section 2 above, we can estimate the costs of tobacco consumption to Nova Scotia by comparison with other provinces. In section 2 it was noted that the Nova Scotia rate of smoking decline since 1985 has been much smaller than in most other provinces. This comparison allows us to assess how much Nova Scotians might be saving if they had reduced their rate of tobacco consumption to the same level as other provinces.

The purpose of this report and of the Cape Breton Cancer Symposium as a whole is not to bemoan how poorly Nova Scotia is doing, but rather to seek solutions. The fact that other provinces have successfully reduced their rate of tobacco consumption, and are therefore successfully saving lives and money, is an inspiration and example, and shows that it can be done. The comparison with Manitoba is especially instructive as Manitoba had the

[77] Health Canada, "Smoking on the Job," op. cit., page 1.
[78] Phillips et. al., "The Economics of Smoking," op. cit., page 469.

same rate of smoking prevalence as Nova Scotia in 1985, and higher rates of per capita cigarette consumption in each of the six years prior to 1994.

There is no reason for Nova Scotia to have the worst rate of tobacco consumption in the country. We have the means to reverse the trend, improve the health of the population, and become a leader in successful tobacco control. Outlining potential "savings" rather than "costs" alone can frame the discussion in a positive way.

Table 4 shows savings to Nova Scotians if they smoked at British Columbia rates (the lowest in Canada), at Manitoba rates, and at average Canadian rates. Years of life saved are calculated at 28 minutes per pack (at a 5% discount rate), as assessed by studies on premature mortality due to smoking.[79]

It should be noted that the additional costs and savings for Nova Scotia are based on 1999 rates of smoking prevalence and consumption, and reflect the widening gap between Nova Scotia and the other provinces since 1992. As Table 1 demonstrates, had the cigarette consumption gap between Canada and Nova Scotia remained at 1992 levels, the potential years of life saved annually would have been 463, rather than 600.

Also, it should be noted that the potential years of life saved in Table 4 is an *annual* assessment. In actual fact these savings are cumulative over time: Every year that Nova Scotians maintain lower rates of smoking, potential years of life saved accumulate at approximately the rate given.

Health care and economic savings are explained above. Because former smokers have a higher risk of mortality and illness for several years after quitting, the life, health care and economic savings in the last three columns will not accrue immediately but over the long term.

Even though the weight of evidence in Section 5 indicates clearly that the CCSA estimate is conservative, a finding confirmed by CCSA's own acknowledgement, that study nevertheless remains the only one with explicit estimates for Nova Scotia. For this reason, the following estimates of savings are based on the CCSA assessments. Estimates in the last three columns should therefore be considered minimum potential savings, with actual cost savings likely to be considerably higher.

[79] Manning, Willard, et. al., "The Taxes of Sin," *Journal of the American Medical Association,* 1989; 261, page 1607. For each pack smoked, the smoker loses 28 discounted minutes of life expectancy at a 5% discount rate. Varying the discount rate will change the estimate substantially. For a full explanation of discounting, please see the GPI greenhouse gas and water resource reports on the GPI web site at www.gpiatlantic.org

Table 4: Potential savings to Nova Scotians if they smoked less

| *If Nova Scotians smoked at:* | Packs a year less smoked (million) | % Less Per Year | Money saved on cigarettes $ millions/yr. | Years of N.S. Life Saved per year | Long-term Health Care Costs Saved $ millions/year | Long-term Economic Savings $ millions/year |
|---|---|---|---|---|---|---|
| **BC rate** | 21.8 | 37% | $108.9 | 1,161 | $40 | $155 |
| **Man. Rate** | 16.3 | 28% | $81.5 | 868 | $30 | $120 |
| **Cdn. rate** | 11.2 | 19% | $56.2 | 600 | $20 | $80 |

Sources: Annual domestic cigarette sales by province from Health Canada, Bureau of Tobacco Control, and Statistics Canada, catalogue no. 32022; comparative provincial smoking rates and cigarette consumption from *CTUMS* 1999; potential years of life saved at 28 minutes a pack from Manning, et. al, "The Taxes of Sin," *Journal of the American Medical Association;* health care and economic savings calculated from CCSA, *The Costs of Substance Abuse in Canada.*

As noted, the first three columns represent short-term savings, and the second three columns represent long-term savings averaged to give annual values. Both categories require further explanation, and so the different cost categories are explored in more detail in the next section.

Also it is clear that, on a *per capita* basis, the economic costs of smoking are about 20% higher in Cape Breton than in Nova Scotia as a whole, due to the Island's higher smoking rate. Therefore, a reduction to the levels suggested in Table 4 by residents of Cape Breton, would result in correspondingly larger per capita savings.

The objectives outlined in Table 4 are not unreasonably ambitious. The U.S. Surgeon-General has outlined a plan to halve the U.S. smoking rate from 25% today to 12% in 2010; and to cut teenage smoking from 35% today to 16% in ten years.[80]

## 8. The Economic Benefits of Smoking Cessation

From a strict medical perspective, smoking cessation is literally the only cure for many smoking-attributable illnesses. A direct causal connection has been established between smoking and the four leading causes of death -- heart disease, cancer, stroke and coronary obstructive pulmonary disease, based on well established relative risk ratios, a direct dose-response relationship, and temporal connections between smoking and disease onset.

[80] Picard, Andre, "Surgeon-General aims to halve US smoking rate," *The Globe and Mail,* 10 August, 2000, page A6.

Because the risk of illness is directly related to the intensity and duration of exposure to cigarette smoke, the risks also decline in proportion to the reduction of this intensity and duration. But the economic costs of smoking will always exceed the economic benefits of quitting, because ex-smokers continue to be at greater risk of illness for several years after quitting than those who never smoked. In other words, as Figure 12 below shows, the savings from quitting are always somewhat lower than the costs of smoking.

The ratio of smoking costs recovered or saved by quitting can therefore only be assessed over a smoker's lifetime, as cessation benefits increase gradually with each year's distance from smoking. Any economic analysis of cessation benefits must therefore be based on changing and declining "relative risk" ratios in each year after quitting. Because the speed of recovery and risk avoidance is different for different illnesses, separate relative risk ratios have been developed for each illness in accordance with years of cessation.

Because of the consequent complexity of economic analyses of quitting benefits, (and also because U.S. lawsuits have focused on damage recovery claims), far more work has been done on assessing the costs of smoking than on estimating the benefits of cessation. Nevertheless, from a medical rather than economic standpoint, the clear causal connection between smoking and disease preserves an underlying simplicity and clarity in the basic argument: ***There is no better way to avert smoking-related illness or to reduce the economic costs of smoking than by quitting.***

In fact, for some leading causes of death, medical and economic analysis frequently goes a step further, and argues that of *all* possible interventions to reduce morbidity and mortality incidence from *any* cause, smoking cessation is by far the most cost-effective.

Here are a few samples from the medical literature:

> *The benefits of smoking cessation are substantial and rapid.*
>
> *No other intervention for cardiovascular disease is likely to be as cost-effective as smoking cessation.*
>
> *Thus, for smokers with coronary heart disease, the main intervention should be smoking cessation. It not only decreases the overall risk of coronary heart disease morbidity and mortality but also rapidly reduces the risk of myocardial infarction....*
>
> (For thromboangiitis obliterans, an inflammatory disease of the arteries and veins), *the only effective treatment is smoking cessation.*
>
> *The study clearly showed that sustained smoking cessation is the best (and possibly only) method of maintaining and potentially improving lung function in patients with early coronary obstructive pulmonary disease.*
>
> *The sooner one quits smoking, the better the preservation of lung function. However, it is never too late to quit, because even smokers who quit after age 60 have significantly better lung function than those who continue to smoke.*

> *Eighty percent to 90% of all lung cancers are directly attributable to cigarette smoking....After about 15 years of abstinence, the risk of death from lung cancer is reduced 80% to 90% compared with that in current smokers.*[81]

Recent evidence published in the British Medical Journal shows that giving up smoking even late in life eliminates most of the lung cancer risk, and that the risk is decreased more than 90% for those who quit before they turn 35. A long-term study of national trends in smoking and smoking cessation in the United Kingdom based on two large case-control studies in 1950 and 1990, found that widespread smoking cessation since 1950 had almost halved the number of lung cancers that would have been expected in 1990 if the former smokers had continued smoking. The study concluded:

> *Mortality in the near future and throughout the first half of the 21st century could be substantially reduced by current smokers giving up the habit.*[82]

Health Canada puts it succinctly:

> *Recent studies show substantially reduced mortality rates for ex-smokers of all ages....People with serious smoking-related illnesses survive longer and recover faster after quitting than those who continue to smoke....Recent studies have demonstrated that, for ex-smokers, much of the damage done by smoking is reversed by the body's natural tendency toward health. The benefits of quitting apply to young smokers and old, to men and women, to those who are still healthy and those who already suffer from smoking-related illnesses.*[83]

In short, the medical benefits of smoking cessation are proven, clear and unambiguous. The *economic* benefits are more complex to assess, and require first, a distinction between immediate and short-term gains on the one hand and long-term cost recovery on the other.

### 8.1 Immediate and short-term economic benefits of smoking cessation

Many medical benefits of smoking cessation are rapid and direct, because the body begins cleansing itself of tobacco toxins immediately a smoker quits. Just two hours after cessation, the concentration of nicotine in the bloodstream can drop by half. Many

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[81] Hays, J. Taylor MD, Lowell C.Dale MD, Richard Hurt MD, Ivana Croghan Ph.D, "Trends in Smoking-Related Diseases: Why Smoking Cessation is still the Best Medicine," *Postgraduate Medicine: Smoking Related Diseases,* volume 104, no. 6, December, 1998, pages 56-66; U.S. Department of Health and Human Services, *The Health Benefits of Smoking Cessation: A Report of the Surgeon-General,* U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, publication no. (CDC) 90-8416, Rockville, Maryland, 1990.

[82] Peto, Richard, Sarah Darby, Paul Silcocks, Elise Whitely and Richard Doll, "Smoking, Smoking Cessation, and Lung Cancer in the UK since 1950: Combination of national statistics with two case-control studies," *British Medical Journal,* 5 August, 2000, 321 (7527), pages 323-329.

[83] Health Canada, *The Benefits of Quitting,* available at: http://www.hc-sc.gc.ca/hppb/tobaccoreduction/factsheets/benefits.htm

smoking effects are reversible within days or weeks, including non-chronic respiratory problems and symptoms associated with cardiovascular disease.[84]

But perhaps the most immediate economic benefit of cessation, and one rarely considered in cost-benefit analyses of smoking, is that the ex-smoker saves money. Indeed the saving can be huge. Most smokers start smoking by age 13, with 12.7 the average age for first smoking a whole cigarette, according to the results of the Nova Scotia Student Drug Use Survey 1998.[85] With a one-day-a-pack habit, a smoker will have spent $15,000 on cigarettes by age 30, and $45,000 by retirement age (*not* counting medical bills).[86]

Provincially, Nova Scotians consumed 1.47 billion cigarettes in 1999, up 32% since the 1991 low point of 1.1 billion. At $5 a pack, Nova Scotians spent $295 million on cigarettes in 1999, equal to 1.5% of the total Gross Domestic Product. If Nova Scotians reduced total consumption to 1991 levels they would immediately save $72 million in disposable income, money they could spend on more productive activities (Figure 8).[87]

Averaged out among all households, Nova Scotians spent 29% more on tobacco products than other Canadians, 31% more than British Columbians, and 49% more than residents of Ontario (Figure 9). Of the 350,000 Nova Scotia households, 47.3% spent an average of $1,520 per household on tobacco products in 1998.[88]

As noted above, low income earners smoke much more than high income earners, with those in the lowest income bracket two and a half times more likely to smoke than those in the highest income bracket. Smoking cessation will therefore likely benefit poorer Nova Scotians more, increase their disposable income, and create greater social equity.

Because almost all cigarettes are imported, this tobacco expenditure damages the local economy by siphoning money from Nova Scotia to central Canada. At producer prices, the inter-provincial trade statistics show that $54.1 million worth of tobacco products were imported into Nova Scotia from Quebec in 1998, and another $32.4 million from Ontario, accounting for nearly 90% of cigarettes sold in Nova Scotia. International cigarette imports cost Nova Scotia an additional $4 million.[89]

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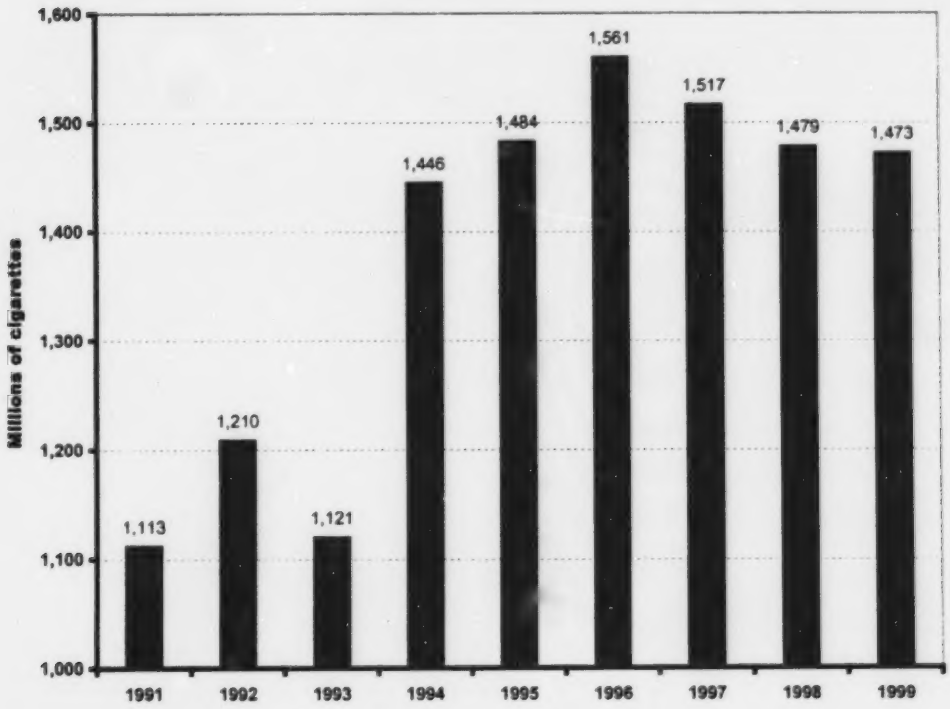
[84] Idem.
[85] Technical Report, page 17.
[86] Health Canada Fact Sheet on "Youth Smoking and Health Risks, " available at: http://www.hc-sc.gc.ca/hppb/tobaccoreducton/factsheets/youth.htm
[87] Health Canada, Bureau of Tobacco Control, "Domestic Cigarette Sales 1972-1999: Nova Scotia;" see also Statistics Canada, catalogue no. 32022.
[88] Statistics Canada, *Spending Patterns in Canada 1998,* catalogue no. 62-202-XPE.
[89] Statistics Canada, *CANSIM* database, Matrix 14011: Interprovincial and International Trade Flows at Producer Prices in Millions of Dollars - Tobacco and Tobacco Products, Tables 1445412-1448712

Figure 8: Cigarette Sales, Nova Scotia, 1991-1999
(Millions of cigarettes)




*NOTE: Cigarette taxes in Nova Scotia were cut by $14 per carton in February 1994. Taxes were subsequently raised by $1.40 in December, 1996; $1.20 in February, 1998; and $1.20 in November, 1999. Note that sales volumes parallel these tax changes almost exactly. When adjusted for inflation, the small tax increases since 1996 have amounted in real prices to only a 1% increase since tobacco prices dropped dramatically in 1994.*[90]

Source: Health Canada, Bureau of Tobacco Control, "Domestic Cigarette Sales, 1972-1999"

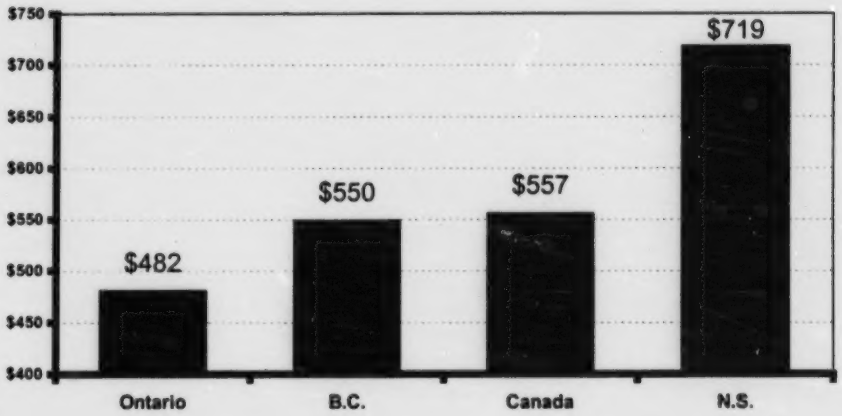
Money not spent on cigarettes but spent on other goods and services would generate additional employment and tax revenue for Nova Scotia, because it is highly unlikely that the money saved would be spent entirely on imports. The shift in spending patterns would produce more spin-offs to the local economy and stem the current outflow to central Canada. As cigarette sales amount to fully 1.5% of provincial GDP, local benefits would likely be substantial in any shift from tobacco to other products.

[90] Canadian Cancer Society, *Surveying the Damage*, Appendix A, Table I, page 69; tobacco tax increases on page 13, and N.S. Finance Department news release: "Federal and Provincial Tobacco Taxes to Rise," November 5, 1999, at http://www.gov.ns.ca/finance/minister/fnews/991105.htm Federal Tax Bulletin to Nova Scotia Wholesalers and Retailers at: http://www.fin.gc.ca

A University of Michigan study comparing the economic spin-offs from tobacco with those of other industries concluded that American states would be in better economic shape if people spent their money on consumer goods other than cigarettes.[91] This is confirmed by Canadian data. Because the cigarette manufacturing process is highly automated, the industry has seen declining employment since 1992, employing only 2,350 workers in 1997, even while profits have increased dramatically. Industry shipments jumped 23% in 1994 following the massive tax cut on cigarettes.[92]

Figure 9: Household Spending on Tobacco Products, Canada and Selected Provinces, 1998

(averaged over all households, including non-consumers)




Source: Statistics Canada, *Spending Patterns in Canada 1998*, catalogue no. 62-202-XPE

In sum, smoking cessation will produce immediate economic benefits by increasing the disposable income of former smokers, decreasing the financial drain on lower income Nova Scotians, and redirecting a portion of consumer spending from imports to locally produced goods.

There is a second immediate short-term benefit of smoking cessation. Unlike other longer-term health and life expectancy gains, smoking cessation among pregnant women will produce short-term benefits that accrue immediately in a lower proportion of low birth-weight babies and other birth complications. Because of the very high costs of neonatal intensive care, smoking cessation before the end of the first trimester will translate into significant health benefits and economic cost savings without delay.[93]

[91] Moore and Mikhail, op. cit., page 201; Greising, D., "Does Tobacco Pay Its Way?" *Business Week*, February 19, 1996, page 89.

[92] Statistics Canada, Manufacturing, Construction and Energy Division bulletin: October, 1999; available at http://www.statcan.ca/english/freepub/32-251-XIE/1999/b/32-251b.htm

[93] Lightwood, James, Ciaran Phibbs and Stanton Glantz, "Short-term Health and Economic Benefits of Smoking Cessation: Low Birth Weight," *Pediatrics*, volume 104, no. 6, December 1999, pages 1312-1320.

Because of the high short-term return on investment in smoking cessation programs among pregnant women, these benefits will be considered in a separate section below.

### 8.2 Long-term Economic Benefits of Smoking Cessation

The benefits of smoking cessation accrue gradually, and can be measured by the difference in the relative risks of illness incurred by current and former smokers. That difference is assessed both according to the duration and intensity of smoking habits. Thus former heavy smokers incur higher relative risks of illness for a longer period than light smokers who quit. Conversely, because the relative risks of illness are significantly greater for heavy smokers, the greatest economic savings to the health care system accrue from early cessation by heavy smokers.

To assess these changing risks over time, along with the consequent economic benefits of quitting, this study uses the incidence-based model developed by Oster, Colditz and Kelly that traces the gradually accruing benefits of quitting over a smoker's lifetime. The authors describe the process in this way:

> *In each year following smoking cessation, then, the benefits of quitting will be equal to the difference between current smokers' and former smokers' marginal costs of illness in that year. In the initial period after a smoker quits, these benefits will be relatively low since quitters' risks of smoking-related diseases remain high relative to their peers who never smoked.*
>
> *Soon, though, these expected annual benefits begin to mount as quitters' marginal risks of health impairment continue to decline. As their risks of smoking-related diseases return to levels experienced by nonsmokers, quitters' benefits in any year approach, in absolute terms, the expected value of costs that will be borne by smokers. Discounting and addition of these expected savings in costs of illness in each year after a smoker quits yield the total benefits of quitting.*[94]

The American Cancer Society's huge study of one million men and women found that within 2-4 years, light smokers had reduced their risk of lung cancer death by two-thirds, and heavy smokers by 13%. After five years, former light smokers had no greater risk than those who never smoked, while former heavy smokers had reduced their risk by half. After 10 years, former heavy smokers had reduced their risk of lung cancer death to only 1% the risk of current smokers. These findings are confirmed by the very large U.K. study described above.[95]

Relative lung cancer incidence rates are shown in Figure 10. After five years, former light smokers have returned to non-smoker risk levels, and after 13 years, former heavy smokers have returned to non-smoker risk levels. Though the American Cancer Society

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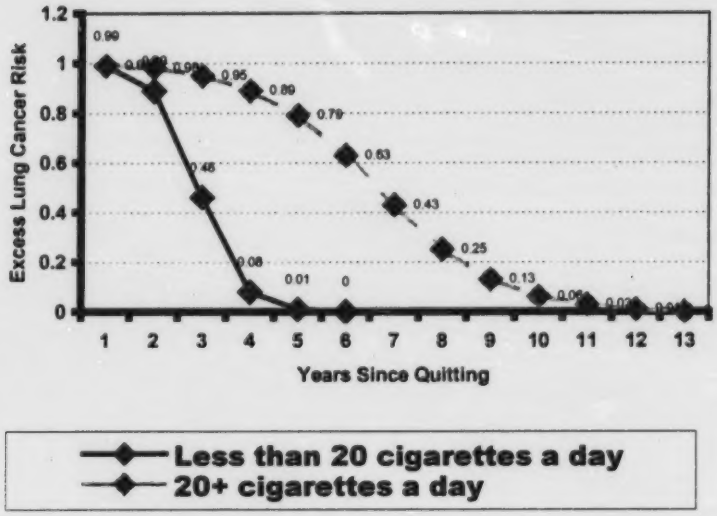
[94] Oster, Gerry, Graham Colditz, and Nancy Kelly, *The Economic Costs of Smoking and Benefits of Quitting*. Lexington Books, D.C. Heath and Company, Lexington, Massachusetts and Toronto, 1984, pages 95-96

[95] Oster, op. cit., pages 96-97, citing American Cancer Society study; Peto, Richard, Sarah Darby, Paul Silcocks, Elise Whitely and Richard Doll, "Smoking, Smoking Cessation, and Lung Cancer in the UK since 1950: Combination of national statistics with two case-control studies," *British Medical Journal*, 5 August, 2000, 321 (7527), pages 323-329.

findings were for men age 50-69, Oster, Colditz and Kelly felt confident that the ratios could be applied to other age groups and to women.

Figure 10: The Effect of Smoking Cessation on Annual Excess Lung Cancer Risk, by former level of former cigarette consumption and years since quitting.

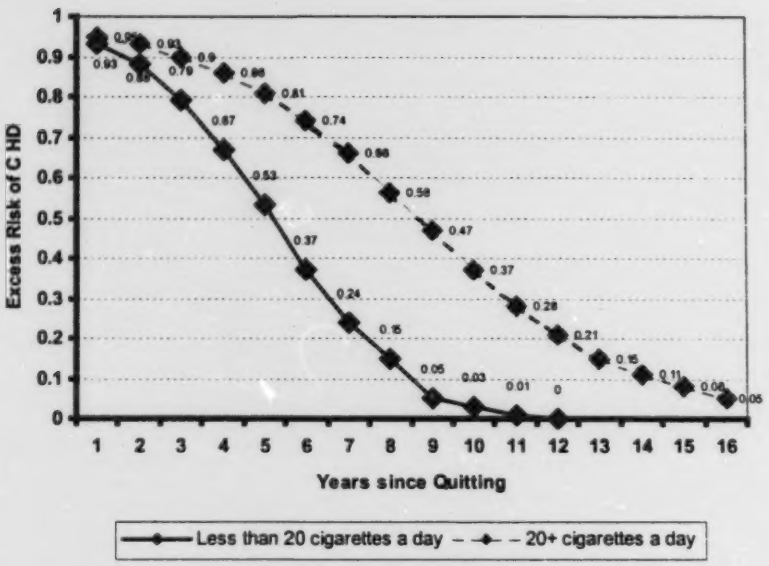



Source: Oster et. al., *The Economic Costs of Smoking and Benefits of Quitting*

The American Cancer Society study also found that former light smokers reduced their risk of death from coronary heart disease by half within five years, with a complete return to non-smoker risk levels after the 10th year of cessation. By contrast, former heavy smokers took far longer to reduce their risk of death from heart disease: It took seven years to reduce the risk by one-third, and more than 10 years to reduce it by two-thirds (Figure 11).[96]

[96] Oster, op. cit., pages 98-100.

Figure 11: Effect of Smoking Cessation on Excess Coronary Heart Disease Risk, by level of former cigarette consumption and years since quitting.




Source: Oster, et. al., *The Economic Costs of Smoking and Benefits of Quitting*

However, smoking causes a decline in lung function that is irreversible, so the decline in risk of death from chronic obstructive pulmonary disease (COPD) is not nearly as dramatic as with lung cancer and heart disease. Smokers can experience an annual decline in lung volume two to three times as great as the normal decline in volume that occurs with age in non-smokers.

From the epidemiological evidence, Oster estimated that light smokers would reduce their risk of COPD by about 50% compared to continuing light smokers; former moderate smokers by about 62% compared to continuing moderate smokers, and heavy smokers by about 70% compared to continuing heavy smokers.[97] However risk levels in this category would never return to those of non-smokers.

For each of these three diseases, and using a 3% discount rate, Oster and his colleagues then calculated the economic benefits of quitting according to sex, age, and intensity of former smoking. They estimated both the direct health care savings, and the indirect productivity savings to the economy (assuming a 1% annual rate of growth in labour productivity.)

[97] Oster, op. cit., pages 100-103.

For the purposes of this study, we have developed a profile of the average Canadian quitter, from data in the Canadian Tobacco Use Monitoring Survey, 1999, and from other Canadian data. This was done by examining the quit rates within each age category and multiplying by the number of smokers within each age group to ascertain that the mean age of quitting in Canada is about 44 years old. This means that roughly half of all Canadian quitters are 45 and older and half are younger. [98] To ascertain the average lifetime benefits of quitting among Nova Scotians who stop smoking, we have therefore taken Oster's estimates for the 40-44 year age group.

We have applied one core GPI principle to our use of Oster's estimates in this analysis. In that study, the estimated costs of smoking and benefits of quitting are very much lower on a per capita basis for women than for men, largely because the *indirect* productivity losses and gains are a lot less. (Per capita health care costs do not differ much). The productivity difference reflects women's much lower rate of labour force participation in 1980, as well as lower female wages, both of which are the basis for the productivity calculations.

By contrast, the Genuine Progress Index explicitly values unpaid household work, two-thirds of which is still performed by women, and thus includes both paid and unpaid work in any analysis of productivity value.[99] Further, an earlier GPI report on *Women's Health in Atlantic Canada* also points to the continuing gender wage gap which, according to Statistics Canada, remains largely "unexplained."[100] As equity is a core GPI principle, it is counter-intuitive to value women's work less than men's in an estimate of indirect costs of smoking and benefits of quitting. We have therefore assumed that the value of women's life gained from smoking cessation is equal to that of men, and we have taken Oster's estimates for male costs and benefits as reflective of all Nova Scotians.

Several other adjustments are necessary to Oster's figures, but the two most important of these roughly cancel each other out. First, Oster and his colleagues examined the costs and cessation benefits of only three smoking-related illnesses. An examination of the morbidity and mortality ratios of *all* smoking related illnesses indicates that these three illnesses, while certainly the major killers of smokers, account for only about 75% of all smoking-related death and illness. Important disease categories not included in the Oster analysis include stroke and other cancers.

At the same time, comparative data from the Canadian Institute for Health Information clearly indicate that U.S. health care costs are considerably higher than comparable Canadian costs. In 1997, total per capita public and private expenditures on health care in the U.S. were almost double those in Canada.[101] Though direct health care expenditures

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[98] *CTUMS*, 1999, Fact Sheet 7.

[99] Colman, Ronald, *The Economic Value of Unpaid Housework and Child Care in Nova Scotia*, GPI Atlantic, Halifax, November, 1998.

[100] Colman, Ronald, *Women's Health in Atlantic Canada*, GPI Atlantic, Halifax, 2000, pages 15-18; Drolet, Marie, "The Persistent Gap: New Evidence on the Canadian Gender Wage Gap," Statistics Canada, Income Statistics Division, December, 1999, catalogue no. 75F0002MIE-99008.

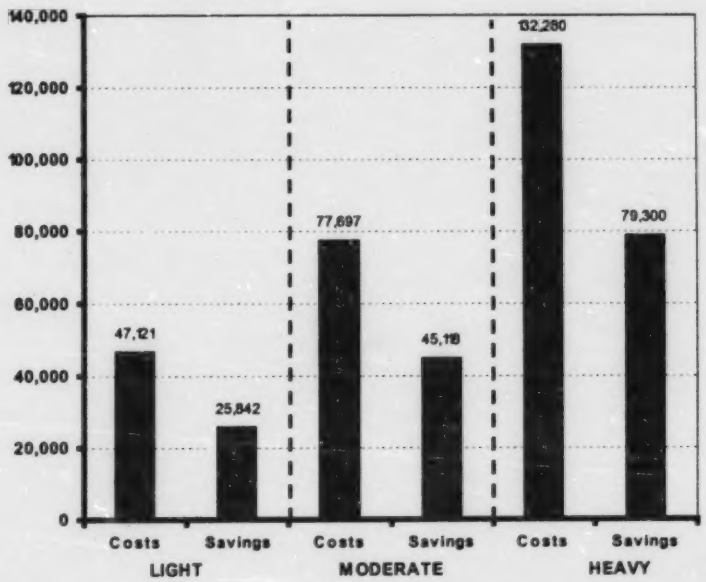
[101] Canadian Institute for Health Information, "How Canada Compares: Health Expenditures per person by the private and public sector in 1997 for G7 countries after adjusting for differences in prices (purchasing

are only a portion of total costs considered by Oster, indirect costs and benefits should also be adjusted by the difference between the U.S. and Nova Scotia average industrial wage.

It has been estimated that the upward adjustment for the illnesses not included by Oster, and the downward adjustment to reflect Nova Scotia's lower health costs and wages will roughly cancel each other out. Oster's life-time cost and saving estimates for smoking and cessation for the 40-44 year age group have therefore been provisionally applied to Nova Scotia to estimate for the benefits of cessation for the average quitter (Figure 12). Greater precision and more direct measurements are clearly desirable in future updates of this report.

It is seen that a light smoker costs the Nova Scotia economy $47,000 over his or her lifetime. Quitting recovers $26,000 of those costs. A moderate smoker incurs lifetime costs of $78,000. If she or he quits, $45,000 of those costs are avoided. A heavy smoker incurs costs of $132,000, but saves $79,000 of those costs by quitting.[102] Needless to say, the "cost recovery ratio" is highest for young smokers, who save the most in avoided costs from quitting early. But cost recovery ratios are still significant for older smokers.

Figure 12: Total Lifetime Costs of Smoking and Benefits of Quitting, age 40-44 ($CAN1999 per smoker and ex-smoker)




Source: Oster, et. al., *The Economic Costs of Smoking and Benefits of Quitting*

power) between countries." Available at: www.cihi.ca/roadmap/health_rep/healthreport2000/report/fig11.htm

[102] Oster, op. cit., Figure 8-2, page 123. All costs are adjusted from 1980 US dollars to 1999 Canadian dollars, using the US-Canadian exchange rate in 1980 ($US1=$CAN1.15), Statistics Canada, *CANSIM* database Matrix 726, Table B3400, and the Nova Scotia "all items" Consumer Price Index, Statistics Canada, *CANSIM* database, Matrix 9960, Table P20300.

In 1999, there were 219,268 smokers in Nova Scotia consuming a total of 1,473 million cigarettes.[103] Using Oster's estimates, if 10% of those smokers quit, they would save the Nova Scotia economy nearly $1 billion in costs over their lifetimes, both through reduced burden on the health care system, and through avoided productivity losses due to premature mortality and sickness (Table 5). This rough estimate assumes that an equal number of light, moderate and heavy smokers quit with an even spread of ages.

If Nova Scotians smoked at Canadian rates, both in terms of prevalence and consumption, then 41,660 Nova Scotians would quit (19% of the total), saving $1.9 billion in avoided costs over their lifetimes. Table 4 above used a completely different methodology (annual prevalence-based rather than lifetime incidence-based) to estimate that if Nova Scotians smoked at Canadian rates they would save $80 million a year in avoided costs. Assuming an average quitting age of 44, and an additional 30 years of life, that method would yield lifetime savings of $2.4 billion, somewhat higher than the estimate given here, but close enough to indicate that both estimates are not unreasonable.

The average 30-year life-span assumption is calculated as follows: Smokers lose an average of seven years of potential life. Applying the 60% cost recovery ratio for moderate smokers (based on $45,000 in avoided costs out of $78,000 in costs had smoking continued), it can be estimated that the average quitter gains back 4.2 years of life that would have been lost had he or she continued smoking (Table 5).

The average life expectancy in Nova Scotia is 77.8 years (74.9 for men and 80.7 for women).[104] Men have a 23% higher smoking prevalence than women in Nova Scotia (31.7% compared to 25.8%).[105] If smoking cessation happens in that same proportion, and if years of life gained are allocated to men and women in proportion to their current smoking rates, then the average life expectancy for quitters of both sexes will be about 74.5 years. Given an average quitting age of 44, we have therefore calculated benefits over an estimated 30-year additional life-span from time of quitting.

One other caveat should be added here. The economic benefits of quitting are averaged here over *all* smokers. Clearly many will not die of lung cancer, heart disease and COPD. Relative risk ratios recognize the increased *risk* of smoking-related illnesses for smokers, but do not imply that all smokers develop the illnesses. Therefore the *actual* lifetime costs for smokers who do suffer from these illnesses due to smoking are very much higher.

Finally, it is worth estimating the true cost of the tobacco tax cut in 1994. If Nova Scotians smoked at the same rate they did in 1993, directly before the tax cut, they would be smoking 24% (or 352 million cigarettes a year) less than they are today (See Figure 8 above). If 24% of current Nova Scotian smokers quit smoking, there would be 52,405

[103] *CTUMS*, 1999; and Figure 8 above.
[104] Health Canada, *Statistical Report on the Health of Canadians*, 1999, page 324.
[105] *CTUMS*, Table 3.

less smokers, who would save the Nova Scotia economy $2.4 billion in avoided costs over their lifetimes.

That savings does not count the actual direct revenue losses sustained by the Nova Scotia treasury due to the tobacco cuts. Since 1994, Nova Scotia has already lost more than $100 million in provincial tobacco tax revenues compared to pre-1994 tax levels.[106] Again assuming a 30-year life-span, and continuation of current trends and tax rates, it can be estimated that the 1994 tobacco tax cut will cost Nova Scotia nearly $3 billion by 2024 in lost revenues, additional health care costs, and lost productivity due to smoking-related disease and premature death.

Until 1994 Manitobans had a 7% higher per capita rate of cigarette consumption than Nova Scotians, and the same smoking prevalence. Despite its common border with low-tax Ontario, (and therefore its potential susceptibility to smuggling), Manitoba retained its high tobacco tax structure. As a direct consequence, Manitobans today consume 28% less cigarettes per capita than Nova Scotians.

If Nova Scotia increased its real taxes to 1994 levels and undertook a determined tobacco control campaign, it is not at all unreasonable for the province to follow Manitoba's example and see 61,395 (or 28%) of Nova Scotia's current 219.268 smokers quit smoking. That cessation effort would save the province $2.8 billion over the lifetimes of those smokers. With additional tobacco tax revenues, the saving would be $3.3 billion.

It should be noted that, like almost all other economic analyses of smoking costs, the Oster estimates do not include the substantial direct savings to smokers outlined in section 8.1 above. Expected lifetime savings (increased disposable income) from quitting are added to the above estimates in the last column of Table 5. Strictly speaking these are not savings to the province, because consumer spending is simply re-directed to other goods and services.

However, our discussion of the lost benefits of spending on cigarettes imported from outside Nova Scotia indicates that at least a portion of these personal income savings *will* accrue to the province in increased employment and taxation revenue from spending re-directed to locally produced goods and services. Because those savings have not been calculated for this study, the savings in disposable income from cigarettes not consumed are given separately in Table 4 rather than added to the cumulative totals, which represent 30-year collective savings by the province as a whole.

### 8.3 A Note on Tobacco Taxes

Note that the 10% and 19% smoking reduction estimates in Table 5 below assume no change in current tobacco tax revenues. The 24%, 28% and 37% estimates assume restoration of tobacco tax revenues to pre-1994 levels, which were maintained by Manitoba and B.C. Manitoba provincial tobacco tax is currently 66% higher than Nova

[106] Canadian Cancer Society, *Surveying the Damage*, Appendix A, Table C, page 65, and figures 7 and 8, page 15 (for tobacco tax revenues to 1998-99 fiscal year), adjusted to add 1999-2000 tobacco tax revenue data from Province of Nova Scotia, Department of Finance, Estimates 1999-2000 and Tobacco Control Unit, N.S. Department of Health.

Scotia levels ($16 compared to $9.64 per carton of 200). British Columbia provincial tax is 128% higher ($22 compared to $9.64).[107]

Although a reduction in smoking rates will reduce provincial tobacco tax revenues, it should be noted that the savings listed in Row 3 (24% reduction) reflect the level of actual tax revenues taken in by Nova Scotia when provincial cigarette consumption was *already* 24% lower than it is today. In other words, the $100 million six-year loss sustained by the Nova Scotia treasury has occurred *despite* the 24% increase in cigarette consumption since 1993.

In addition, the widely different provincial tobacco tax rates in Canada indicate that Nova Scotia could continue to raise its provincial tobacco tax *beyond* pre-1994 levels to compensate for any decline in tobacco tax revenues due to smoking cessation. The fact that British Columbia has *both* the highest tax structure *and* the lowest consumption rates in Canada indicates that there is no obstacle to Nova Scotia continuing to raise its tobacco taxes at least to current British Columbia and Newfoundland levels ($22 a carton).

In any case, there is no *inevitable* decline in tax revenues due to smoking cessation. Taxation is a policy instrument subject to change, as the three small tobacco tax increases of 60 cents, 70 cents, and 60 cents since November 1996 alone clearly demonstrate. That much sharper increases are a viable option is demonstrated by the November 1999 recommendation of the Nova Scotia Fiscal Management Task Force for a tax surcharge of $1 per pack ($8 per carton).[108]

Clearly a coordinated strategy with neighbouring Maritime provinces would strengthen such a strategy and prevent inter-provincial cigarette smuggling. Given Quebec's newly announced tobacco control initiative, and the fact that Quebec has been raising its taxes at a one-third faster rate than Nova Scotia since 1994 makes it highly likely that Quebec would join such an initiative, and thus prevent an increase in smuggling.[109]

For the purposes of this analysis (Table 5), it is therefore assumed that the provincial government sets its desired level of tobacco tax revenues at pre-1994 levels, and adjusts taxes to maintain those revenues over time. In Table 5, actual revenue losses since 1994 are taken as a proxy for potential revenue gains from higher tobacco taxes, and these estimates are held constant over the 30-year time period for the reasons discussed.

In Table 5 below, note that Column 4 represents the estimated cumulative 30-year savings that can be expected to result from smoking cessation due to both avoided direct health care costs and avoided indirect productivity losses. Former smokers have reduced rates of absenteeism and premature mortality compared to current smokers and therefore

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[107] Canadian Cancer Society, *Surveying the Damage,* Appendix A, Table A, adjusted for additional 60 cent increase announced in Nova Scotia on November 5, 1999 (N.S. Finance Department news release: "Federal and Provincial Tobacco Taxes to Rise," at http://www.gov.ns.ca/finance/minister/fnews/991105.htm Federal Tax Bulletin to Nova Scotia Wholesalers and Retailers at: http://www.fin.gc.ca )

[108] Nova Scotia Voluntary Planning Agency, *Taking Control of our Future,* Draft Report, November, 1999.
[109] American Cancer Society, *Surveying the Damage,* Appendix A, Table I, page 69; and *The Chronicle-Herald,* Halifax, October 5, 2000, page A15: "Quebec Out To Discourage Smoking."

realize productivity gains by quitting. In Column 5, years of life gained here are simply assessed at 4.2 per ex-smoker, based on an average 60% cost recovery ratio and an average seven years of lost life among smokers. Because these years are not discounted, totals do not match the totals in Table 3 above, which are based on a 5% discount rate.

Column 6 represents the amount saved by individual smokers as a result of not spending money on cigarettes. It therefore represents money immediately available for spending on other goods and services. While column 4 reflects actual gains to the Nova Scotia economy, more complex calculations would be necessary to determine the net benefits to Nova Scotia from the re-directed spending in Column 6. Though a portion would be re-directed from cigarette imports to spending on locally produced goods and services, the entire sum does not reflect a *net* economic benefit for the province. For this reason, the savings are listed separately here and assumed to accrue to the former smokers rather than to the province as a whole.

Table 5: Estimated Lifetime (30-Year) Savings from Cessation for Nova Scotia

($1999 millions)

| Quit Rate | Number of NS quitters | Additional tax revenue | Total 30-yr savings | Years of life gained | $ not spent on tobacco |
|---|---|---|---|---|---|
| **10%** (no tax hike) | 21,927 | | $989 | 92,093 | $884 |
| **19%** (no tax hike) (Canadian rate) | 41,660 | | $1,880 | 174,972 | $1,679 |
| **24%** (w. tax hike) (1993 NS rate) | 52,405 | $500 | $2,864 | 220,101 | $2,121 |
| **28%** (w. tax hike) (Manitoba rate) | 61,395 | $500 | $3,270 | 257,859 | $2,475 |
| **37%** (w. tax hike) (B.C. rate) | 81,129 | $500 | $4,160 | 340,742 | $3,270 |

### 8.4 A Note on Methodology

It should be recalled that all estimates are highly sensitive both to the methodology used to calculate savings, and to the choice of discount rate in assessing lifetime costs and savings. Simply put, the size of the discount rate reflects the value placed on the future in relation to the present. The lower the discount rate (the less we "discount" the future), the more we value future years of life, and the higher the estimate of potential savings from smoking cessation.

A difference of a single percentage point in the discount rate can change cost-benefit outcomes by a third. Oster's 3% discount rate, the basis for this analysis, is definitely at the lower end of the range of possible discount rates which can go as high as 8% or 10% (the rate recommended by the Treasury Board.) Oster's results therefore yield much higher values than studies using higher discount rates.

Even more influential in determining valuations of the benefits of smoking cessation is the methodology employed. The vast majority of studies use a "prevalence-based"

approach that is a snapshot of estimated smoking-attributable costs in a particular year, based on the current prevalence of smoking in a given population and the relative risk for morbidity and mortality attributable to smoking for different illnesses.

But that method clearly has significant limitations, because it cannot adequately account for the temporal relationship between smoking and disease onset. Though relative risk ratios do not change much over time, *current* sickness and death due to smoking is the product of *past* smoking prevalence and intensity, because of the delay between smoking and disease-onset. It is acknowledged that "incidence-based" approaches, which track changing relative risk ratios over the lifetime of the smoker, are far more accurate indicators for valuation purposes.

The main problem with the incidence-based approach is that it is far more complicated. Relative risk ratios over time are different for different diseases, and each one needs to be tracked separately over the smoker's lifetime to assess potential costs at different ages depending both on intensity and duration of consumption.

Because the intensity and duration of consumption in a mixed-aged population of smokers and former smokers varies widely, it is challenging to extrapolate from incidence-based approaches to overall population estimates at any given time. For example, the dramatic increase in youth smoking in the 1990s will show up as an illness and premature mortality trend many years in the future, while current sickness and death reflect an older profile of smokers in the past. Changing ratios among male and female smokers complicate the picture further.

Nevertheless, an incidence-based approach is really the *only* accurate way to assess the benefits of smoking cessation, since these benefits accrue gradually over time and never quite recover the full costs of smoking. Costs of smoking cannot simply be converted automatically into benefits of quitting, as if the two were equal. Instead the actual, *dynamic* process, which incidence-based approaches attempt to capture, is the gradual recovery of a substantial portion of those (avoided) costs over time.

The age of the quitter, and the intensity and duration of consumption prior to cessation are key variables affecting calculations of the benefits of quitting smoking. These variables affect not only health care outcomes, but also productivity calculations of years of productive life saved. In short, the incidence-based approach is the only methodology properly capable of estimating the economic benefits of quitting in relation to the costs of smoking. But it is challenging to apply, and it can yield results quite different from the "snapshot" prevalence-based approach.

One review of the literature found that benefit-cost ratios of smoking cessation varied from 2.22:1 for a prevalence-based approach to 7:1 for an incidence-based approach.[110] To illustrate how both the methodology and discount rate can affect valuation outcomes, it is noteworthy that a Canadian estimate using a prevalence-based approach and a 4%

[110] Phillips, David et. al., "The Economics of Smoking," *PharmacoEconomics*, volume 3, no. 6, 1993, page 466.

discount rate rather than 3%, estimated average lifetime costs among both smokers *and* ex-smokers at $18,200, considerably smaller than the estimates for smokers given here.[111]

Because the benefits of quitting can only be assessed by separating out smokers from non-smokers, Oster's incidence-based approach has been used in this study. Hopefully this short methodological discussion will assist other researchers in conducting sensitivity analyses of the results given in this report, so that they can be tested against alternative discount rates and methodologies, and adjusted correspondingly if necessary.

[111] Stephens, Thomas, et. al., "School-based Smoking Prevention: Economic Costs versus Benefits," *Chronic Diseases in Canada,* volume 21, no 2, 2000, Health Canada, page 3.

# PART 3: THE ECONOMICS OF TOBACCO CONTROL INTERVENTION IN NOVA SCOTIA

As mortality and morbidity due to smoking is directly related to intensity and duration of cigarette consumption, many different combinations of actions can produce the cost savings outlined in Part 2. The intensity of consumption can be reduced (people can smoke less), smokers can quit, and teenagers can avoid taking up the habit at all. Given the dramatic increase in teenage smoking in the 1990's, efforts to reduce smoking prevalence in Nova Scotia must clearly involve *both* active cessation by current smokers *and* active discouragement of potential new smokers.

Following the generalized estimates of potential cost savings from cessation, this final part of the study therefore assesses the potential cost-effectiveness of particular smoking reduction interventions. It must be emphasized here that the literature clearly recognizes that a combination of many strategies (tobacco tax increases, school-based programs, physician advice, counseling for pregnant women, anti-tobacco advertising, easier access to nicotine-replacement therapy, restrictions on smoking in public places, etc.) is far more effective than any single one alone.

Experience in many jurisdictions demonstrates a positive synergistic impact from the interaction of several concordant strategies to produce highly successful anti-tobacco health promotion campaigns. For example, a study on Canadian tobacco control published in the *American Journal of Public Health* found that, while higher cigarette prices and no-smoking by-laws are both effective in controlling smoking, either alone will have less impact than the two measures together.[112]

Therefore, although the following sections examine the cost-effectiveness of alternative interventions separately, this does not imply that discrete choices should be made simply according to higher benefit-cost ratios for certain strategies. Employing several strategies in tandem will enhance the overall benefit-cost ratio of *all* interventions. That cannot be demonstrated in the separate benefit-cost analyses that follow, and must therefore be stated explicitly in this preamble.

Also, as pointed out earlier, the economic costs of smoking are about 20% higher per capita in Cape Breton and northern Nova Scotia than in the province as a whole, due to the those regions' higher smoking rate. Therefore, anti-tobacco interventions targeted to the eastern and northern regions of the province may be particularly cost-effective.

## 9. Price Mechanisms: Restoring Pre-1994 Tobacco Taxes

A detailed 1999 World Bank assessment of alternative tobacco control interventions throughout the world concludes unequivocally that "tax increases are by far the most cost-effective intervention, and one that compares favorably with many health

[112] Stephens, Thomas, Linda Pederson, John Koval and Charles Kim, "The Relationship of Cigarette Prices and No-Smoking Bylaws to the Prevalence of Smoking in Canada," *American Journal S of Public Health*, volume 87, no. 9, September, 1997, pages 1519-1521.

interventions."[113] Because it is literally a "stroke-of-the-pen" intervention, a tax increase incurs "zero or minimal costs" to implement, according to the World Bank. The world-wide assessment further found that, even accounting for the consequent drop in cigarette consumption, a modest 10% increase in cigarette excise taxes would increase tobacco tax revenues by about 7%.[114]

Much has already been said in the previous sections on the impact of the drastic cuts in tobacco taxes in February, 1994 on cigarette consumption in Nova Scotia. Figure 8 and Table 5 above provide data both on the actual increase in Nova Scotia cigarette sales following the tax cut, and the potential cost savings to Nova Scotia from a reduction of cigarette consumption to pre-1994 levels. As well, the exhaustive 70-page analysis released in October 1999 by the Canadian Cancer Society and other groups, entitled *Surveying the Damage: Cut-rate Tobacco Products and Public Health in the 1990s,* provides the most thorough analysis of the tax issue published to date.

What is needed now, in order to refine the earlier cost-benefit analysis, is to assess not only the *overall average* impact of a particular policy measure, as considered in Part 2, but its potential effect on particular groups. This section therefore assesses the available evidence on the impact of prices on tobacco consumption by age, sex, and income group, and the consequent likely impact of a tobacco tax hike to pre-1994 levels on Nova Scotian consumption habits. In particular, the significant impact of price on youth smoking has especial importance for cost-benefit analysis, as Oster's lifetime analysis clearly demonstrates that quitting young provides disproportionate economic benefits.

### 9.1 Evidence on Price Elasticity

Expected declines in consumption in response to price increases are determined by "price elasticity" ratios.[115] It is a basic rule of free market economics that consumer demand is responsive to price fluctuations. For example, if the price of bread were to double, people would eat fewer sandwiches. If it were given away for free, people would eat much more of it. Because nicotine is addictive, tobacco is relatively more "price inelastic" than some other consumer products.

Price elasticity ratios are expressed in terms of the anticipated decline in consumption that can be expected from a 1% increase in prices. Thus, for example, a British study published in the British Medical Journal found the price elasticity of demand for cigarettes to be -0.5 for men and -0.6 for women. In other words, every 10% increase in cigarette prices would lead to a 5% decline in consumption among men and a 6% decline in consumption among women.[116] That finding is very slightly higher than the U.S.

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[113] World Bank, *Curbing the Epidemic: Governments and the Economics of Tobacco Control,* The World Bank, Washington D.C., 1999, page 77.

[114] Ibid., pages 8-9.

[115] For a clear discussion of price elasticities in relation to tobacco, see Canadian Cancer Society, *Surveying the Damage,* pages 5-11.

[116] Townsend, Joy, Paul Roderick and Jacqueline Cooper, "Cigarette smoking by socioeconomic group, sex, and age: Effects of price, income, and health publicity," *British Medical Journal,* 8 October, 1994, volume 309 , pages 923-927.

Surgeon-General's estimate of a -0.47 overall price elasticity for cigarettes, with similar results calculated for Western Europe and Canada.[117]

The World Bank's global assessment is more conservative, and estimates that a price rise of 10% on a pack of cigarettes would reduce demand by about 4% in high-income countries, and by about 8% in low and middle-income countries. Worldwide, the Bank estimated, a 10% global increase in cigarette prices would cause 40 million smokers to quit and prevent a minimum of 10 million tobacco-related deaths.[118]

The effectiveness of price increases in controlling tobacco consumption is demonstrated by comparative analysis, as in the earlier assessment of Manitoba and Nova Scotia consumption trends. Similar analyses have been conducted in the USA.

On January 1, 1993, Massachusetts imposed a 25-cent excise tax on cigarettes that raised prices by 15% per pack. Four months later, cigarette manufacturers responded by reducing prices, so that most smokers experienced an increase in the cost of smoking for less than 6 months. Nevertheless, consumption data show a 12.5% drop in cigarette sales in Massachusetts from 1992 to 1993, compared with a 3% drop nation-wide. A follow-up phone survey found that the price increase had helped persuade 3.5% of smokers to quit completely, and an additional 35% to consider quitting. Even more had cut back on consumption.[119]

Similarly, a 25-cent tax per pack on cigarettes (on top of the existing 10-cent tax) in California in 1989, as part of the Proposition 99 anti-tobacco measures, is credited with doubling the rate of decline of cigarette purchases in the ensuing three years. From 1980 through 1988, per capita cigarette purchases had been declining at an average annual rate of 3.6%. Following the tax increase, purchases fell by an average of 7.2% per year from 1989 to 1991.[120]

Because 20% of the new tax revenues were specifically designated by the Proposition 99 initiative for anti-tobacco education in schools and communities, and funded a major anti-smoking advertising campaign, only a portion of the dramatic decline in sales can be attributed directly to the price increase. Nevertheless, it is noteworthy that the tax itself made possible the other tobacco control activities, and so remains the primary agent in bringing about the decline in smoking.

It is also noteworthy that the first year of the California price increase saw the sharpest decline in consumption (9.4% in a single year). One analysis concluded definitively:

> *Clearly, the California tobacco excise tax sharply accelerated the drop in both sales of cigarettes and in smoking. The data also suggest that the impact of the tax*

[117] Canadian Cancer Society, *Surveying the Damage*, page 5.
[118] World Bank, *Curbing the Epidemic*, page 8.
[119] Biener Lois, Robert Aseltine, Bruce Cohen and Marlene Anderka, "Reactions of Adult and teenaged Smokers to the Massachusetts Tobacco Tax," *American Journal of Public Health*, volume 88, no. 9, September, 1998, pages 1389-1391.
[120] Breslow, Lester and Michael Johnson, "California's Proposition 99 on Tobacco, and its Impact," *Annual Review of Public Health*, 1993, number 14, pages 585- 604; see especially pages 590 and 597.

> *did not continue alone. The state's paid advertising campaign against tobacco use and its many other statewide, regional, and local tobacco control activities supported by revenues from that tax already seem to be contributing to curtailment of cigarette smoking among Californians.*[121]

### 9.2 Effects of Price Increases by Income

However, the general data on the consumption impacts of price increases mask important differences in response among different population groups. It has already been noted that price increases have a marginally greater impact on women than men. The U.K. study found that "price was a significant factor in cigarette consumption by age for women in every age group and for men aged 25-34."[122]

The same study also found marked differences in response according to income, which helps explain the World Bank's assessment that a 10% price increase would lead to an 8% decline in low-income countries and only a 4% decline in high-income countries. For the lowest income group (bottom one-fifth), the price elasticity was -1.0 for men, and -0.9 for women. That means that a 10% increase in price would lead to a 10% decline in consumption among the lowest income groups, which *also* have the highest rates of cigarette consumption.

For unskilled manual workers, the price elasticity of demand was -1.4, (compared to zero for professional men,) indicating that a 10% price increase would produce a 14% decline in consumption for those workers. The authors concluded that "tax increases would have the greatest impact on men with the highest smoking rates and mortality," and could actually help reduce social inequities:

> *There is little doubt that price has a major effect on cigarette consumption and thus smoking related diseases, especially in low socioeconomic groups. To use this effective tool of preventive medicine therefore seems the right public policy.*
>
> *Our results suggest that the main effects of increasing the real price of cigarettes (for example by tax increases) would be to reduce the prevalence of smoking in men and women in lower socioeconomic groups (those with the highest levels of smoking and the greatest mortality from smoking related diseases....This suggests that real increases in the price of cigarettes will both reduce smoking and help to reduce the differences in the prevalence of smoking and smoking related diseases between socioeconomic groups.*[123]

### 9.3 Effects of Price Increases on Youth Smoking

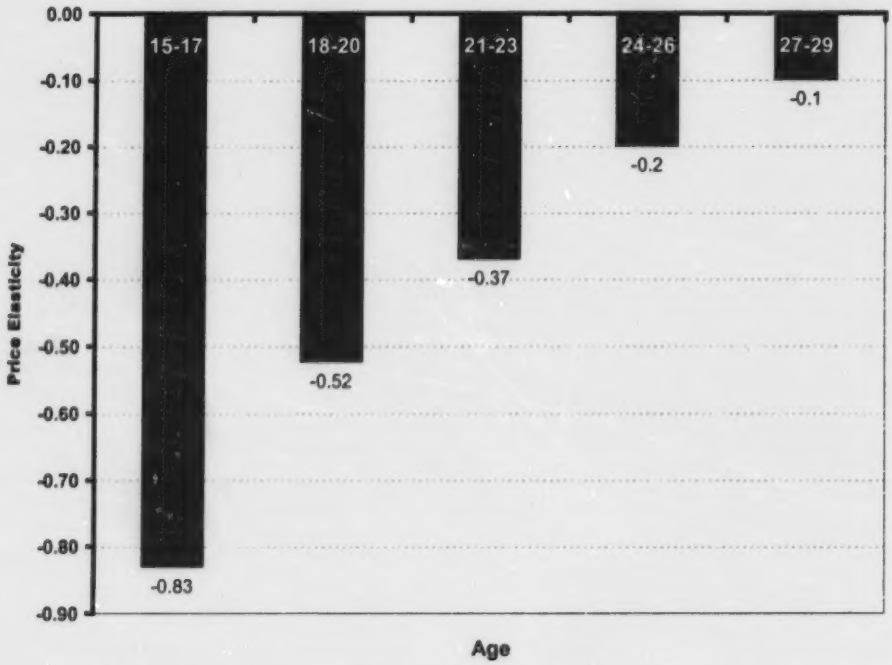
Numerous studies have found an equally strong relationship between price and youth smoking trends. In Canada, the prevalence of smoking among young people declined by

[121] Ibid., pages 597-598.
[122] Townsend, op. cit., page 923.
[123] Ibid., pages 924, 926 and 927.

52% between 1980 and 1989, as the price of cigarettes doubled, a trend that was sharply reversed in the 1990s.[124]

The most detailed study of the relationship between price and youth smoking, was a U.S. analysis of 34,145 respondents aged 15-29 to the 1992-1993 Tobacco Use Supplements to the Current Population Survey.[125] The study found that, within this age group, the price elasticity of current smoking varied inversely with age (Figure 13.) Note that this chart reflects the effect of price on smoking *prevalence* rather than on level of consumption as discussed above.

Figure 13: Price Elasticity of Current Smoking by Age, 15-29, U.S.A.




Source: Jeffrey Harris and Sandra Chan, "The Continuum of Addiction: Cigarette Smoking in Relation to Price Among Americans Aged 15-29," *Health Economics* 8, 1999.

The authors found their results had important implications for public policy, as price seemed to have the greatest impact on discouraging young experimenting smokers who were not yet addicted. They found that among 15-17 year olds, the price elasticity of smoking some days was six times greater than the price elasticity of smoking every day (-1.85 compared to -0.3). In other words, a 10% price increase produced an 18% reduction in occasional smoking, but only a 3% reduction in daily smoking. They concluded:

[124] Stephens, et. al., op. cit., page 1520.

[125] Jeffrey Harris and Sandra Chan, "The Continuum of Addiction: Cigarette Smoking in Relation to Price Among Americans Aged 15-29," *Health Economics* 8, 1999, pages 81-86.

> *Public health policy needs to consider the impact of price increases on the number of experimenting smokers, and not just the number of young people who smoke every day. Our findings suggest that nicotine addiction is acquired and reinforced over an extended time period, starting in the teenage years and continuing at least through the mid-to-late 20s.*
>
> *In a young experimenter, whose 'stock of addictive capital' is relatively low, an increase in price can result in an abrupt, permanent shift to a new, non-smoking lifetime trajectory. As the smoker's addictive stock grows, however, an increase in price is more likely to cause only a marginal reduction in the number smoked. At the youngest ages, the impact of a change in price may also be amplified by bandwagon effects* (e.g. reduced peer pressure.)[126]

These conclusions are confirmed in a report by the U.S. Surgeon-General on youth smoking, which also found that price is more likely to affect the decision to start smoking than to affect the behaviour of those who have already begun.[127]

Several other U.S. studies confirm the conclusion that price elasticity varies inversely with age. A 1981 study found that a 10% increase in price would reduce youth smoking by 12%. Recent estimates are more conservative, but still find that a 10% increase in the price of cigarettes would reduce the number of teenagers who smoke by 7% and daily consumption of teenage smokers by 6%, well in excess of estimates for the general population.[128]

An assessment of a proposed Congressional 43-cent tax hike that would raise cigarette prices by 23% estimated that teenage smoking would fall by 16% and teenage cigarette consumption by 14% if the bill became law. In Nova Scotia, this would translate into 3,133 less teenage smokers age 15-19, and 1,024 less premature deaths in this age group.[129]

The study found that peer pressure has a "positive multiplying effect" on teenage smoking:

> *A rise in price curtails youth consumption directly and then again indirectly through its impact on peer consumption (if fewer teenagers are smoking, fewer other teenagers will want to emulate them.)*

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[126] Ibid., pages 83-84.
[127] U.S. Centers for Disease Control and Prevention, Office of Smoking and Health, *Preventing Tobacco Use Among Young People: A Report of the Surgeon-General,* Department of Health and Human Services, Atlanta, 1994.
[128] Grossman, Michael and Frank Chaloupka, "Cigarette Taxes: The Straw to Break the Camel's Back," *Public Health Reports,* volume 112, July-August 1997, pages 291-297.
[129] Ibid., page 296.

That study concluded that "an excise tax hike is a very effective policy with regard to teenagers because they are so sensitive to price....A substantial tax hike would curb youth smoking; this strategy should move to the forefront of the antismoking campaign." [130]

These findings are critically important in assessing the long-term impacts of tobacco control policy measures, because 90% of smokers begin the habit as teenagers, and 82% of daily smokers began smoking before age 18.[131]

Therefore, "cigarette control policies that discourage smoking by teenagers may be the most effective way of achieving long-run reductions in smoking in all segments of the population":

> *A tax hike would continue to discourage smoking for successive generations of young people and would gradually affect the smoking levels of older age groups as the smoking-discouraged cohorts move through the age spectrum. Over a period of several decades, aggregate smoking and its associated detrimental health effects would decline substantially.*[132]

From an economic perspective, the evidence that tax hikes have a disproportionate impact on youth makes them a particularly cost-effective policy instrument. The estimates in Part Two on the potential cost savings of smoking cessation are based on the existing profile of Canadian quitters (mean age: 44). But any measure that reduces smoking at younger ages will dramatically amplify these savings.

According to Oster's lifetime analysis of the benefits of quitting, lowering the mean age of quitting by ten years can increase the total economic benefits of quitting by 62%.[133] Thus, if the mean age of quitting were ten years younger than at present, a 10% reduction in Nova Scotian cigarette consumption would produce $1.6 billion in savings rather than $989 million. In short, the fact that tax hikes more effectively discourage youth smoking than adult smoking considerably enhances their long-term cost-effectiveness.

One other element of tax increases further amplifies their cost-effectiveness. Among the general population, as noted above, a 10% rise in prices will cause cigarette consumption to fall by about 4% (compared to 7% among teenagers.) However, longer-term analyses have found that this decline has a multiplier effect over time. Thus, a 10% price rise will indeed reduce consumption by 4% after one year, but by as much as 8% after 20 years.[134]

### 9.4 What is the appropriate level of tobacco taxation?

In Nova Scotia, current cigarette prices are presently 19% below pre-1994 prices. Adjusted for inflation according to the consumer price index for tobacco products,

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[130] Ibid., pages 291, 294 and 297

[131] U.S. Centers for Disease Control and Prevention, Office of Smoking and Health, *Preventing Tobacco Use Among Young People: A Report of the Surgeon-General,* Department of Health and Human Services, Atlanta, 1994.

[132] Grossman, op. cit., page 296.

[133] Oster, op. cit.: This calculation is based on moderate smokers aged 35-39 compared to moderate smokers aged 45-49, from Table 8-7, page 122.

[134] Grossman, op. cit., page 296.

cigarette prices are actually 21.6% below 1993 levels.[135] A return to pre-1994 levels would mean a $9 tax increase per carton at current prices. Adjusting for inflation, this means an effective $10 per carton increase that would raise existing carton prices from $38.97 for 200 cigarettes to about $49, an effective 25% increase in real prices.[136]

This $10 per carton increase is specifically recommended by the Canadian Cancer Society and associated groups.[137] Given the current tax structure that splits tobacco tax revenues between the federal and provincial governments, this would probably mean a $5 federal and $5 provincial increase. But if the federal government is unwilling to act decisively, there is no barrier to Nova Scotia raising taxes by $10 on its own. Newfoundland and British Columbia both currently have provincial tobacco taxes of $22 per carton, compared to $9.64 in Nova Scotia. A $10 provincial tax hike in Nova Scotia would still not match the highest tax provinces.

A $10 per carton taxation increase can be expected to produce a cigarette consumption decline of 10% in the general population, and a decline in youth smoking of 17.5%, with consequent 30-year savings of more than $1 billion, plus additional tobacco tax revenues of $500 million. There would be 3,472 fewer Nova Scotia youth smoking, saving 1,120 premature deaths. Among the population as a whole, there would be 22,000 fewer Nova Scotians smoking, saving about 95,000 potential years of life over their remaining life-spans.[138]

In particular, given the evidence examined above, there would be a large cohort of potential teenage smokers who would never take up the habit. Every day in Nova Scotia about 20 teenagers try a cigarette for the first time, and about half of them will become daily smokers. Like 90% of current smokers, they will be addicts by the time they turn 20.[139] Given the very high price elasticity for beginning experimental smokers noted above, a 10% price increase is likely to discourage four Nova Scotian teenagers every day from starting to smoke.

It should be emphasized that this $10 per carton taxation increase simply returns Nova Scotia to pre-1994 tax levels in real prices. Even at that level, the carton price would still be lower than in British Columbia ($49.59) and Newfoundland ($53.30).

Figure 14 shows current Nova Scotia cigarette prices and tax incidence by comparison with other jurisdictions. Clearly, even an increase to Newfoundland levels, currently the highest in the country, leaves room for future tax increases that can further reduce consumption and save health costs.

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[135] Statistics Canada, *CANSIM* database, Matrix 9960, "Consumer Price Indexes for Nova Scotia," Table P203114: "Tobacco Products and Smokers' Supplies."

[136] Current prices supplied by N.S. Department of Health Tobacco Control Unit; adjustments for inflation are from Statistics Canada, *CANSIM* database, Matrix 9960, Table P203000: Consumer Price Index for Nova Scotia, "All Items" classification. Tax increases since 1994, adjusted for inflation are from Canadian Cancer Society, *Surveying the Damage*, Appendix A, Table I, page 69.

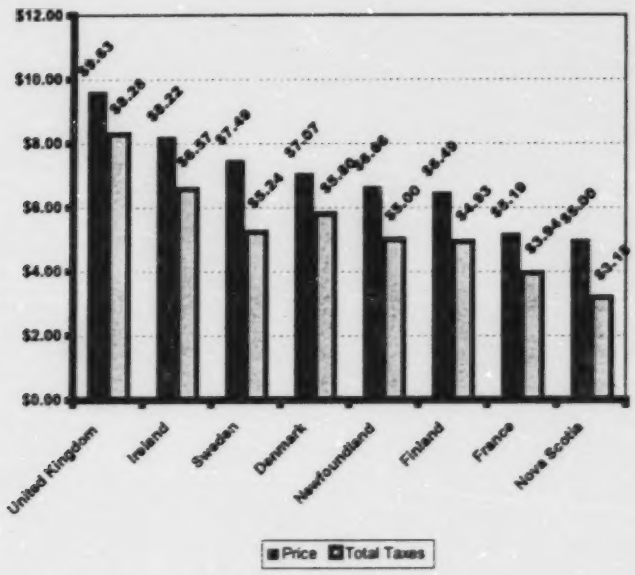
[137] *Surveying the Damage*, Recommendations: page 59.

[138] See Table 4 above, adjusted upwards to reflect the higher rate of youth cessation.

[139] Based on estimates in the U.S. Surgeon-General's Report, *Preventing Tobacco Use Among Young People*, op. cit., chapters 3 and 4.

Figure 14: Cigarette Prices and Taxes, Selected Jurisdictions, Price per Pack

($CAN 2000, March 1, 2000, for equivalent of 25-cigarette pack)

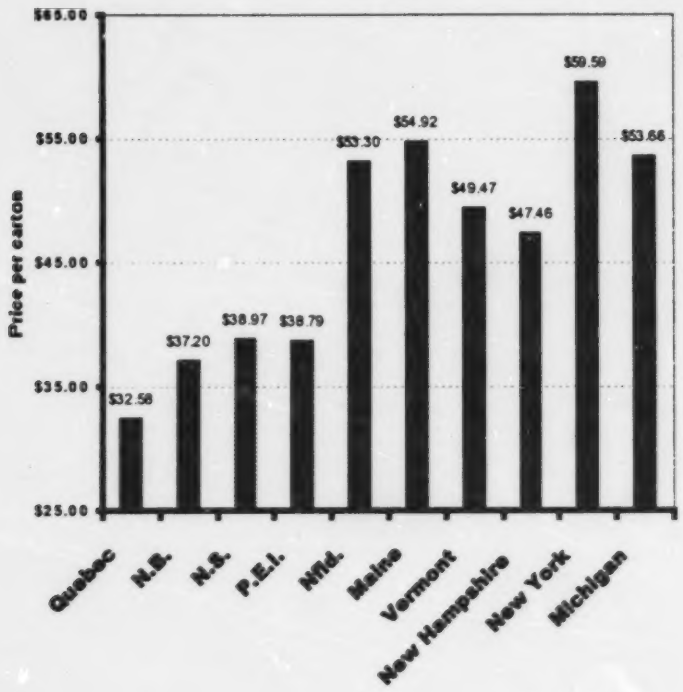



Source: Smoking and Health Action Foundation, Ottawa, "Global Cigarette Taxes and Prices."

## 9.5 Curbing Cigarette Smuggling

Most importantly, there is actually no good policy reason for maintaining low taxes. The apparent reason for cutting tobacco taxes in 1994 no longer exists. At that time, the rationale was to curb smuggling of cigarettes from lower-priced U.S. border states. But litigation settlements between the U.S. states and the tobacco companies have significantly raised the price of cigarettes in the border states so that they are now much higher than in the Maritimes. Figure 15 shows relative prices in August 2000:

Figure 15: Average Price of Carton of 200 cigarettes, Eastern Canada and U.S. border states, August, 2000
($CAN 2000)




Source: Smoking and Health Action Foundation, Ottawa

As Figure 15 clearly shows, any danger of smuggling from low-priced U.S. border states that may have existed in 1994, has now clearly passed. Even in retrospect, however, there is reason to doubt the rationale for reducing taxes given in 1994[140]:

1) The five Canadian provinces that maintained high taxes did not see a significant erosion of legitimate sales as predicted.

2) New criminal investigations have found that the tobacco industry abetted and profited directly from the smuggling. More than 90% of smuggled cigarettes originated in Canadian factories, and were sent to the U.S. to return as contraband. Cigarette exports from Canada to the U.S. increased ten-fold between 1989 and 1993.[141] A stiff export tax would have prevented the smuggling far more effectively than a tax cut.

[140] The following information is taken from Canadian Cancer Society, *Surveying the Damage*, esp. parts 4 and 5; and from the Smoking and Health Action Foundation, "The 1994 Tobacco Tax Cuts: Revenue Impact and Policy Alternatives," available at http://www.nsra-adnf.ca/staxrevimp.html

[141] Canadian Cancer Society, *Surveying the Damage*, parts 4 and 5, esp. pages 26-28, 31-32, and 36-39

The industry has profited even more from the subsequent tax cuts, with an estimated single-year expansion of the total tobacco market in Canada by 10%. Since the 1994 tax cut, Imperial Tobacco has also filled the price void by raising prices six times, thereby increasing its profit margin by 50% (from 40c per pack to 60c per pack.)

Annual pre-tax tobacco industry profits in Canada sky-rocketed by 62% ($1.33 billion) between 1993 and 1998, while government revenues fell by $4.77 billion due to the tax cuts. The public loss has been a tobacco industry gain.

3) There are far more effective anti-smuggling actions that will not reduce government revenues and increase tobacco consumption and health costs. These measures include an effective export tax and more prominent tax-paid markings on cigarettes and tobacco packages to identify legal products.

An analysis of the impacts of cigarette smuggling in the most recent issue of the *British Medical Journal* (October 13, 2000), sternly warns other countries not to follow the Canadian example of cutting tobacco taxes to try to curb smuggling. Report author, Martin Raw of the University of London's School of Medicine calls the Canadian results "an absolute disaster."[142]

In sum, the reduction of tobacco taxes has produced tremendous costs both in lost revenues, long-term economic costs, and lost lives due to smoking-related illness, With high tobacco prices in the U.S. border states, there is now no remaining reason to keep tobacco prices low.

Restoring tobacco taxes at least to pre-1994 levels in real prices through a $10 a carton tax hike is probably the single simplest and most cost-effective measure to reduce tobacco consumption and its enormous costs in Nova Scotia. The evidence presented in this study confirms the World Bank's conclusion that raising tobacco taxes is "by far the most cost effective intervention" that governments can make.

### 9.6 Closing a Tax Loophole

Throughout this report, we have used "tobacco" and "cigarettes" almost interchangeably. But at this point, some finer distinctions are necessary. Raising tobacco taxes on cigarette taxes will have only a limited effect on tobacco consumption if other tobacco products are not taxed comparably. Currently, manufactured cigarettes are taxed at a much higher rates than roll-your-own ("fine cut") tobacco.[143]

This discrepancy helps explain why Newfoundland has not succeeded in dramatically lowering its smoking rates, despite having the highest cigarette taxes in the country ($22 per carton in provincial taxes alone). With the sole exception of British Columbia, all other provinces have far lower provincial taxes on 200 grams of fine-cut tobacco than

[142] Helen Branswell, "Canada Ridiculed for Lowering Tobacco Taxes to Curb Smuggling," *The Chronicle-Herald,* Halifax, October 13, 2000, page D16.

[143] Information in this section is summarized from Canadian Cancer Society, *Surveying the Damage,* pages 16-19, and Appendix A, Tables A to C.

they do on 200 cigarettes. Federal excise tax and duty on fine-cut tobacco is just $5.80 per 200 grams of fine-cut tobacco compared to $10.75 for 200 cigarettes.

New "expanded" tobacco products reduce the amount of tobacco needed in a roll-your-own cigarette, provide more cigarettes per weight, and lower smoking costs dramatically. Taxes have not adjusted to this new reality. In Nova Scotia the consumer cost "per smoke" is 19 cents for a manufactured cigarette, and 6 cents for a "roll-your-own" cigarette (Rockport 'expanded' tobacco brand.) In Newfoundland, the cost is 27 cents for a manufactured cigarette, but only 8 cents for a "roll-your-own."

Nor surprisingly, fine-cut tobacco sales are 45.4% of the total tobacco market in Newfoundland, more than double any other province. In Nova Scotia, fine-cut tobacco constitutes 18.6% of the market, and in Ontario it has only 2.2% of the market.[144] Newfoundland smokers are effectively evading the province's very high taxes on manufactured cigarettes by turning to roll-your-owns.

There is an important lesson here for Nova Scotia if it restores pre-1994 tobacco tax rates. For the measure to be effective, taxes have to be raised proportionately on *all* tobacco products. British Columbia (with the lowest smoking rates in the country) is the model here, with a flat $22 tax on 200 cigarettes, 200 tobacco sticks, and 200 grams of fine-cut tobacco. By contrast, Nova Scotia's current tax on fine-cut tobacco is only $6.70.

The Canadian Cancer Society recommends that the tax rate on the quantity of roll-your-own needed to make a cigarette (now considerably less than 1 gram) should equal the tax rate on one cigarette.[145] By that measure, a Nova Scotia provincial tax hike of $10 per carton should be matched by a tax hike of $12 for 200 tobacco sticks, and at least $15 for 200 grams of fine-cut tobacco.

Given the crisis in Nova Scotia's health care system, and the province's ongoing pleas to Ottawa for more health care funding, the raising of tobacco taxes is a unilateral action that the province can take at any time to raise needed revenues and to reduce the long-term burden of smoking-related illnesses on the health care system. Undertaking this action in concert with the other two Maritime provinces will ensure success.

### 9.7 Government Revenues from Illegal Sales to Nova Scotia Children

There are today more than 16,000 underage smokers in Nova Scotia, who each smoke an average of nine cigarettes per day. Assuming they pay for their cigarettes, Nova Scotia children and underage teens spend $10.6 million a year for illegal purchases of more than 53 million cigarettes.[146]

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[144] Ibid. Figure 10, page 19.
[145] Ibid., page 60.
[146] Figures in this section are from *Surveying the Damage*, Appendix A, Table H, page 68.

Here are the taxes that the federal and provincial governments collect from the illegal sale of cigarettes to minors in Nova Scotia:

- Federal tobacco taxes: $2.7 million
- Provincial tobacco taxes: $2.4 million
- Provincial Sales tax: $700,000
- HST: $608,000

**TOTAL: $6.4 million**

A *British Medical Journal* analysis of this issue points out that it is a fundamental legal principle that no one should be able to profit from criminal activity or keep the proceeds of criminal activity. If government itself followed this principle, argue the authors, it would "ringfence all of its income from tax on illegal sales of tobacco to children and dedicate that money to smoking prevention activities." A $6.4 million smoking prevention budget would go a long way to curbing smoking among teenagers in Nova Scotia (see following sections).

The following chapters focus on what the World Bank has called "non-price" tobacco control interventions that can function effectively in tandem with the price measures outlined here.

It must be acknowledged that important federal initiatives to ban tobacco advertising, mandate graphic labels on cigarette packages, and require detailed industry information on products and practices are among the most progressive in the world. Canada is the first country in the world to implement such strong labeling and reporting measures, which will come into effect by January, 2001.[147] Because this study focuses on what can be done in the future, and particular what can be done independently by Nova Scotia, these important initiatives are not included in the analysis that follows.

## *10. Smoking Prevention in Nova Scotia Schools*

Tax and price-based strategies to reduce tobacco use must be supplemented by non-price interventions in order to be fully effective. California's Proposition 99 dedicated 20% of new tobacco tax revenues specifically to school and community education programs dedicated to smoking prevention and cessation.

It is noteworthy that despite the enormous costs of smoking, the Canadian Centre for Substance Abuse found only $213,000 dedicated to tobacco prevention and cessation programs in Nova Scotia in 1992.[148] Current spending is estimated at about $450,000, or 48 cents per capita.[149] For a population the size of Nova Scotia's, the U.S. Centers for

[147] Health Canada news releases on new tobacco control initiatives, January 19, January 20 and June 28, 2000, available at http://www.hc-sc.gc.ca/english/archives/releases/2000

[148] Canadian Centre on Substance Abuse, op. cit., Table 12. The CCSA identifies $14,000 of the total as workplace tobacco cessation programs. All dollar values are translated into $CAN1999 using the Consumer Price Index.

[149] N.S. Department of Health, *Supporting a Nova Scotia Comprehensive Tobacco Strategy that Works*, 48 cents per capita based on NS Government commitment of $450,000 for tobacco control, June, 2000.

Disease Control recommend *minimum* funding of $CAN 9.5 million or about $10 per capita per year to implement any kind of effective tobacco control policy.[150]

The following sections examine the cost-effectiveness of prevention and cessation programs identified in the literature as having proven effectiveness in reducing tobacco consumption and the economic costs of smoking-related illness. In light of the high cost-effectiveness of preventing and reducing the incidence of teenage smoking, as discussed in the previous section, we begin with school-based interventions. As noted in valuations of smoking cessation, economic benefits increase in inverse proportion to age -- the earlier it happens the greater the benefits.

Nova Scotia is blessed with an outstanding school-based smoking prevention curriculum supplement identified nationally as one of the best in the country. Including full sets of colour overhead slides and graphics, the Nova Scotia Department of Health's "Smoke-Free for Life" program has curricula for grades primary to three, grades 4-6, and grades 7-9.[151]

A study commissioned by the Canadian Association for School Health and funded by Health Canada, specifically picked the Nova Scotia curriculum as an "exemplary program" that exceeded the minimum requirements for effectiveness by 80% when evaluated by number and length of sessions.[152] The study found that classroom programs less rigorous than the Nova Scotia one have been shown to reduce smoking incidence by 6% initially and by 4,8% indefinitely, with the drop-off due to a relapse rate of 20% over four years.

The study also found that full program development and delivery costs for the minimal program, including consultant fees (for program development), staff salaries (particularly teacher time), teacher training, costs for evaluation, revision and dissemination, and all associated administrative and materials expenses came to $70 per student exposed. That estimate is based on 10 sessions spread over four years in grades 6-9, with grade 6-8 sessions 30-minutes long, and grade 9 sessions 45-minutes long.

For the "preferred program" (Nova Scotia's "Smoke-free for Life"), the researchers calculated costs at $125 per student, based on 18 half-hour sessions in grades 4-7.[153] It should be noted that these are the full four-year costs of program delivery, not annual costs. Calculations include both classroom sessions and teacher training time, for a total of 9.1 hours of teacher time for the minimum program and 16 hours for the Nova Scotia program. All operating costs, including even capital costs and debt service are included in the program cost.

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[150] N.S. Department of Health, Tobacco Control Unit Briefing Notes, April, 2000, based on U.S. recommendations of November 19, 1998, and a 1.45 exchange rate.

[151] N.S. Department of Health, Drug Dependency and Tobacco Control Unit, "Smoke-Free for Life: A Smoking Prevention Curriculum Supplement," 3 volumes, 1996.

[152] Stephens, Thomas, Murray Kaiserman, Douglas McCall and Carol Sutherland-Brown, "School-based Smoking Prevention: Economic Costs versus Benefits," *Chronic Diseases in Canada,* volume 21, no. 2, 2000, Health Canada, Laboratory Centre for Disease Control. Costs are given in $1999.

[153] Stephens, op. cit., pages 2-3

Total annual costs for a national smoking prevention program in Canadian schools that reached 1,167,000 pupils were found to be $20.7 million, based on the minimum program. To reach 36,000 Nova Scotia students with this minimum program would cost $633,000. To implement the exemplary Nova Scotia curriculum would cost $36.2 million in Canada and $1.1 million in Nova Scotia. Annual cost estimates are based on amortizing program development costs over three years and adding annual program delivery costs.[154]

Since the "Smoke-Free for Life" curriculum extends from grades primary to nine, a more ambitious program might seek to reach a larger cohort of students than considered in the Canadian Association for School Health analysis. In 1999, there were 76,000 Nova Scotia students ages 10-15 (grades 4-9), the prime age for smoking initiation.[155] To reach all these students would cost $2.3 million a year.

It has been noted that the Nova Scotia Student Drug Survey found 12.7 to be the average age students first smoked a whole cigarette. The student drug use survey also found that smoking rates among Nova Scotia teenagers increased nearly 40% between 1991 and 1998, from 26% to 36%. [156] Reference has also been made to recent research published in the *British Medical Journal* that found 12-13 year old smoking experimenters becoming addicted within days of their first cigarettes, including manifesting withdrawal symptoms, needing more nicotine, and losing control over number of cigarettes smoked.[157] Dr. David Kessler, Commissioner of the U.S. Food and Drug Administration has called teenage nicotine addiction "a paediatric disease."[158]

Clearly, therefore, the 10-15 age group is the prime target for smoking prevention programs, and well-targeted interventions might help reverse the disturbing and costly teenage smoking trends of the 1990s.

Based on an extensive literature review of school program effectiveness, Stephens and his colleagues based their estimate of benefits on an initial 6% reduction in teenage smoking among students exposed to the minimum curriculum, and a longer-term 4% reduction. This was more conservative than earlier studies that found a 20% decay in program effectiveness over four years to an enduring 4.8%. Here benefits are estimated based on a 33% decay from the initial 6% decline.

The authors estimated lifetime health care and productivity savings of $18,200 for every person who would have smoked but did not do so as a result of the program, a considerably more conservative estimate than that used in this report. Even based on that conservative estimate, the minimum school-based program would produce $15.40 in savings for every $1 dollar invested in program development and delivery. Delivered to

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[154] Idem. Nova Scotia estimates are based on comparative population statistics, using Statistics Canada's most recent (September 27, 2000) provincial population estimates for July 1, 2000.

[155] Statistics Canada, *CANSIM* database, Matrix 6370: "Population by Single Years of Age," Nova Scotia, Tables C893261-C893276, for ages 10-15.

[156] *Nova Scotia Student Drug Use: Technical Report,* op. cit., page 17.

[157] "Teens can get Addicted to Nicotine Early - Study," Halifax Daily News, September 12, 2000, page 13.

[158] World Health Organization, Fact Sheet No. 197, May, 1998: "Tobacco Use by Children: 'A Paediatric Disease.'"

36,000 Nova Scotia students, the program would produce net savings of $18.7 million annually to the province. Delivered to all 76,000 fourth to ninth graders in the province, it would save nearly $40 million a year.

If the exemplary and more expensive Nova Scotia "Smoke-Free for Life" curriculum produced no greater reduction in smoking than the minimum program, it would still yield $8.80 in savings on avoided health care costs and productivity losses for every $1 invested. That would still produce annual savings of $11 million delivered to 36,000 students, and $23 million delivered to 76,000 students.

If, as seems much more likely, the Nova Scotia curriculum produced a greater reduction in the number of teenage smokers in direct proportion to the additional investment and classroom sessions, it would lead to a 10.5% decline in teenage smoking initially and a 7% reduction in the long-term. That could save Nova Scotia $33 million a year delivered to 36,000 students, and $69 million a year delivered to all 76,000 10-15-year-olds in the province (Table 6).

Table 6: Cost-Effectiveness of School-based Smoking Prevention Programs and Estimated Annual Savings to Nova Scotia ($1999)

| | |
|---|---|
| 4-year program cost: Minimum (MIN) program (per student) | $70 |
| 4-year program cost: N.S. "Smoke-Free for Life" (SFFL) (per student) | $125 |
| MIN benefit-cost ratio (6% smoking decline down to 4% after 4 years) | 15.4 |
| SFFL benefit-cost ratio (6% decline → 4%) | 8.8 |
| SFFL based on 10.5% decline → 7% after 4 years | 15.4 |
| Annual cost savings: MIN to 36,000 N.S. students | $19 million |
| Annual cost savings: MIN to all 76,000 NS 10-15 year-olds | $40 million |
| Annual cost savings: SFFL to 36,000 at 10.5% decline → 7% | $33 million |
| Annual cost savings: SFFL to all 76,000 NS 10-15 year-olds | $69 million |

Unfortunately, the outstanding Nova Scotia "Smoke-Free for Life" curriculum is not required in Nova Scotia schools, and is not being used as widely as it could be. In May and October 1996, the Nova Scotia Department of Health conducted a series of in-services around the province to update teachers on the youth smoking issue and to introduce the new smoking prevention curriculum for grades P through 9.

An August 1997 program evaluation conducted by Canmac Economics for the N.S. Health Department's Tobacco Control Unit yielded only an 18.5% response rate. [159] It can probably be assumed that most elementary and junior high school teachers who did not respond, did not use the curriculum, because the introductory letter to the survey specifically mentioned the Smoke-Free for Life program. In other words, given the very small response rate, the survey results are almost certainly biased towards users of the curriculum.

[159] Canmac Economics Ltd., *Smoke-Free for Life Evaluation*, prepared for Nova Scotia Department of Health, August, 1997, Table 5.

Of those teachers who did respond, 24% used the Smoke-Free for Life curriculum, and 29% said they taught tobacco education using some other program. The remaining 47% did not provide any education about smoking and its health effects, or incorporate smoking prevention into their curricula in any way.[160]

The problem is not confined to Nova Scotia. The U.S. Surgeon-General has estimated that school-based anti-tobacco programs can prevent or postpone smoking in 20 to 40 per cent of adolescents while less than 5% of U.S. schools have adequate education programs.[161]

There is clearly a missed opportunity here. An outstanding school-based smoking prevention program, probably the best in Canada, and singled out in the Canadian Association for School Health study as an "exemplary" curriculum, is not being used in most Nova Scotia schools. While teenage smoking has increased by 40% since 1991, there is still a very high percentage of teachers who provide no smoking prevention education at all.

Clearly the blame is not on individual teachers, most of whom are under intense pressure to cover required curriculum basics with minimum resources. Given the extremely high benefit-cost ratio of school-based prevention programs (15.4:1, using the most conservative assumptions), this study strongly recommends that the Smoke-Free for Life curriculum be required as part of the core school curriculum for grades P-9. Universal program implementation in the province could substantially reduce the province's very high teenage smoking rate, and produce annual savings of $70 million in avoided health care costs and productivity losses.

## 11. Smoking Cessation Programs for Pregnant Women

We have already noted the very high costs of smoking among pregnant women. Beyond the costs to the life and health of the smoking mother, she is more likely to miscarry, give birth to a low birth-weight infant (<2,500 grams), and see her child die in the first year of life. Infants born to smoking mothers more often require extensive neonatal intensive care and suffer long-term impairments to physical and intellectual development, due to intrauterine growth retardation. Smoking is responsible for about 25% of low birth-weight cases, and infants born to smokers have a 20% greater risk of perinatal death.[162]

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[160] Ibid., Tables 1A, 1B and 2.

[161] Andre Picard, "Surgeon-General Aims to Halve U.S. Smoking Rate," *The Globe and Mail*, 10 Augtust, 2000, page A6.

[162] Adams, Kathleen, and Cathy Melvin, "Costs of Maternal Conditions Attributable to Smoking During Pregnancy, " *American Journal of Preventive Medicine*, volume 15, no. 3, 1988, page 213; Grossman, Michael and Frank Chaloupa, "Cigarette Taxes: The Straw to Break the Camel's Back," *Public Health Reports*, volume 112, July-August, 1999, page 294; Chang Qing Li, Richard Windsor, and Mahmud Hassan, "Cost Differences between Low Birthweight Attributable to Smoking and Low Birthweight for All Causes, " *Preventive Medicine*, volume 23, 1994, pages 28-34; Lightwood, James, Claran Phibbs, and Stanton Glantz, "Short-term Health and Economic Benefits of Smoking Cessation: Low Birth Weight," *Pediatrics*, volume 104, no. 6, December, 1999, pages 1312-1320; Marks, James, Jeffrey Koplan, Carol H ogue and Michael Dalmat, "A Cost-Benefit/Cost-Effectiveness Analysis of Smoking Cessation for Pregnant Women," *American Journal of Preventive Medicine*, volume 6, no. 5, 1990, pages 282-9.

Beyond the enormous suffering caused by smoking during pregnancy, these conditions are also very expensive. One analysis found that the daily cost of hospital treatment for low birth-weight and neonatal intensive care was 80% higher than average hospital bed-day. Compared to other diseases with a high smoking-attributable risk, the cost of low birth-weight hospital bed-days was 83% higher than for stroke, 70% higher than for chronic obstructive pulmonary disease, and 53% higher than for cancer.[163]

One U.S. study assessed and tallied the high costs of maternal conditions attributable to smoking during pregnancy, including placenta previa, abruptio placenta, ectopic pregnancy, preterm premature rupture of the membrane (PPROM), and spontaneous abortion. Even without considering the effects of smoking on infant health care costs, the study found these conditions alone produced medical care costs of $220 million ($CAN1999) in the U.S.[164] Another U.S. study found that excess direct medical cost per live birth for each pregnant smoker was $759 ($CAN1999) for a total of $393 million.[165]

It was noted earlier than 27.6% of pregnant women in Nova Scotia report smoking during their pregnancy.[166] There is reason to believe that even this high prevalence may be underestimated. A New Zealand study compared self-reports of smoking by pregnant women with cotinine samples that reveal current smoking status bio-chemically, and found that nearly a quarter of smoking pregnant women did not report smoking. Of those who did, the amount smoked was often under-reported. The authors speculated that the pressure to stop smoking likely led to mis-reporting, and concluded that "prevalence measurements of smoking in pregnancy based on self report are very inaccurate."[167]

In sum, even though smoking during pregnancy produces great risks for mother and child at very high cost, it continues to occur at a very high rate in Nova Scotia. Of 10,562 live births in Nova Scotia in 1996, about 2,900 were delivered to mothers who smoked during pregnancy. Of those 10,562 births, there were 571 low birth-weight babies (<2,500 grams) born, of whom 150 were likely attributable to smoking during pregnancy.[168] The 1992 CCSA study also attributed six Nova Scotian deaths from sudden infant death syndrome, congenital abnormalities and perinatal conditions to smoking.[169]

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[163] Phillips, David, et. al, "The Economics of Smoking," op. cit., page 467. For one of the most precise calculations of medical care costs due to low birth-weight attributable to smoking, see Chang Qing Li, op. cit.. That study finds that low birth-weight costs due to smoking are up to 18% less than low birth-weight for all causes, because cases of intrauterine growth retardation (often due to smoking) are usually less severe than those due to pre-term delivery. Nevertheless, even with an 18% discount, low birth-weight due to smoking costs much more than most hospital conditions.

[164] Adams, op. cit., page 212.

[165] Lightwood, op. cit., page 1312.

[166] Kirkland, Susan, Linda Dodds and Gerry Brosky, "The Natural History of Smoking Duering Pregnancy Among Women in Nova Scotia," *Canadian Medical Association Journal*, volume 163, no. 3, August 8, 2000, pages 281-2.

[167] Ford, R.P.K., D. Tappin, P.Schluter and C. Wild, "Smoking During Pregnancy: How Reliable are Maternal Self-Reports in New Zealand?", *Journal of Epidemiology and Community Health*, volume 51, 1997, pages 246-251.

[168] Health Canada, *Statistical Report on the Health of Canadians*, 1999, pages 25 and 257.

[169] CCSA, *The Costs of Substance Abuse in Canada*, Table B63.

Like teenage smoking, this is clearly a specific target area for smoking cessation programs that can yield a very high benefit per dollar invested. In addition, as noted earlier, unlike other smoking-attributable illnesses, smoking cessation during pregnancy can yield gains that are immediate and short-term.

One overview of the literature on smoking cessation cost-effectiveness found that "approaches which targeted reduction or cessation in specific subgroups (e.g. targeting pregnant women who smoke, in order to reduce the frequency of stillbirth and low birthweight babies) showed larger gains than those which took a more general population approach."[170]

The empirical evidence bears out these findings. One U.S. study found that an annual drop of one percentage point in smoking prevalence among pregnant women would shift 1,300 low birth-weight babies to normal weight and save $31 million ($CAN1999) in direct medical costs. In seven years it would prevent 57,200 low birth weight infants and save $850 million in direct medical costs. The study concluded that "smoking cessation before the end of the first trimester produces significant cost savings from the prevention of low birth weight."[171]

Translated into Nova Scotia numbers (without adjusting for differential health care costs or smoking prevalence), a one percentage point annual reduction in smoking among pregnant women in Nova Scotia would reduce the self-reported smoking rate from 27.6% today to about 20% after seven years. In those seven years, it would shift 200 low birth-weight babies to normal weight, and save the province $3 million in excess medical care costs.

Again, it must be remembered that low birth-weight can lead to long-term impairments to physical and intellectual development. Though they count the high costs of neonatal intensive care, none of the cost studies have estimated the long-term social and economic costs of such disabilities, including impact on employment prospects and quality of life. For this reason, cost-benefit studies of smoking during pregnancy frequently acknowledge that their estimates are conservative and confined to direct medical costs at time of birth and in the neonatal stage.

How can the high rate of smoking among pregnant women in Nova Scotia be reduced? Fortunately, there are excellent smoking cessation programs specifically designed for this purpose. One U.S. study found that a program costing just $41 per participant could achieve a quit rate of 15%.[172] The simple, inexpensive program consisted of a single 15-minute counseling session, simple instructional materials ($7), and two follow-up telephone calls, all carried out by a nurse or health educator. The $41 cost included all staff time, materials and overhead expenses.[173]

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[170] Phillips, et. al., "The Economics of Smoking," page 466.

[171] Lightwood, et. al., page 1312.

[172] All values are in 1999 Canadian dollars, converted using Statistics Canada's exchange rates (*CANSIM* database, Matrix 926, Table B3400), and Consumer Price Indexes for Health Care and for All Items, Matrices 9957 and 9960.

[173] Marks, et. al., "A Cost-Benefit/Cost-Effectiveness Analysis of Smoking Cessation for Pregnant Women," *American Journal of Preventive Medicine*, volume 6, no. 5, page 282.

In a single year, the program would shift more than 20 Nova Scotian low birth-weight babies to normal weight, and prevent one death from sudden infant death syndrome, congenital abnormalities or perinatal death. Compared to the cost of caring for those low birth-weight babies in a neonatal intensive care unit, the smoking cessation program would save $3.31 for every $1 invested. When avoided long-term care costs for low birth-weight infants with disabilities are added in, the benefit to cost ratio of the smoking cessation program doubles to 6.6:1, or $6.60 for every dollar invested.

In dollar terms, it would cost $119,000 to deliver this smoking cessation program to 2,900 pregnant smokers in Nova Scotia, for a saving in direct medical neonatal care costs of $394,000, and $785,000 when avoided long-term infant care costs are added. Most of this saving, it must be emphasized, is recouped in the short-term. Because the benefit is realized immediately, discounting is not necessary.

The U.S. study authors compared these cost savings from a modest smoking cessation program to other standard prenatal and perinatal prevention programs. Neonatal metabolic screening was found to have a benefit-cost ratio of about 5:1; maternal serum alpha-fetaprotein screening about 2:1; screening for Down's syndrome in women 40 and older about 2:1; and prenatal care 3.4:1.

In short, in terms of results achieved per dollar invested, a smoking cessation program for pregnant women was found to be highly cost-effective, and more than double the overall cost savings attributed to the rest of prenatal care. The researchers concluded with this forthright recommendation:

> *Based on this analysis and those documenting the health benefits and effectiveness of cessation programs, we conclude that physicians, third-party payers, managed-care organizations, and public health programs should offer this preventive service to all pregnant women who smoke....These findings argue for routinely including smoking cessation programs in prenatal care for smokers.*[174]

The significant benefits described by the U.S. researchers here do not include the savings in avoided health care costs, premature mortality and lost productivity due to smoking-related illnesses for the mother herself. With a quit ratio of 15%, 430 pregnant women in Nova Scotia would cease smoking every year as the result of such a program. Because of their relative youth, their cumulative lifetime cost savings, using Oster's incidence-based approach, would be very high, -- nearly $20 million for all 430 quitters.

If each of these 430 former smokers continues to abstain and live for 55 years after their pregnancy to the average 81-year life expectancy for Nova Scotian women,[175] that lifetime saving amounts to more than $800 a year in avoided medical costs and lost productivity for each quitter. That is about $350,000 a year for all 430 quitters. When this

[174] Marks, et. al., op. cit., pages 282 and 287.
[175] Health Canada, *Statistical Report on the Health of Canadians*, page 324.

saving is added to the infant savings, the benefit-cost ratio increases to almost 10:1 or $10 in savings for every $1 invested in the program.

Like the previous two recommendations, on tobacco tax increases and school-based smoking prevention programs, smoking cessation programs for pregnant women will yield very significant short and long-term benefits for a very modest investment. These are all obvious interventions, clearly worth the price.

## *12. Anti-tobacco Advertising*

Though specific interventions targeting teenagers and pregnant women will be highly cost-effective, as shown, it must be acknowledged that the vast majority of smokers will remain unaware of prevention and cessation measures confined to schools and prenatal care. Fortunately, there are strategies of proven effectiveness that can reach the larger population.

A detailed econometric analysis of cigarette consumption in California between 1980 and 1992, using quarterly data and controlling for time, price, tax and other variables, found that a vigorous state-sponsored anti-tobacco media campaign starting in 1989 was highly effective in drastically reducing cigarette consumption.

Of a 1.33 billion pack decline in cigarette sales between 1990 and 1992, the researchers attributed a 232 million pack decline (17.4% of the total) specifically to the media campaign.[176] From 1989 through 1996, California per capita consumption of cigarettes fell 1.93 packs faster than the rest of the United States.[177]

Applying the 7.7 pack per capita media-attributable decline to Nova Scotia, it is possible to project that an anti-tobacco media campaign in Nova Scotia, as effective and vigorous as the one in California, would produce a 12.3% decline in cigarette consumption (7.2 million packs) over two years.[178]

Any consumption decline will reflect a mixture of outright quitting and reduced consumption by smokers who do not quit. Either way, smokers and ex-smokers would immediately save $36.2 million over those two years, -- money that is available for spending on more productive activities. If the 12.3% consumption decline translated into a 12.3% quit rate, there would be 27,000 fewer smokers in Nova Scotia.

An anti-tobacco media campaign like that in California would save 400 years of life in Nova Scotia resulting just from the two-year 7.2 million pack consumption decline, (assessed according to the standard 28 minutes of life per pack formula.) Using the methods outlined for Table 5 above, a 12.3% quit rate would eventually translate into long-term (30-year) savings of 113,135 extra years of life for Nova Scotians -- life that

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[176] Hu, T-W, H-Y Sung, and T, Keeler, "Reducing Cigarette Consumption in California," *American Journal of Public Health,* volume 85, 1995, pages 1218-1222.

[177] Goldman, Lisa, and Stanton Glantz, "Evaluation of Antismoking Advertising Campaigns," *Journal of the American Medical Association,* volume 279, no. 10, March 11, 1998, page 776.

[178] Per capita extrapolations are based on the1990 California population of 30 million, *Statistical Abstract of the United States, 1997;* 117th edition, U.S. Department of Commerce, page 28, Table 26: "Resident Population - States: 1970-1996."

would have been lost if those 27,000 smokers had kept smoking. Cumulative savings in avoided health care costs and lost productivity would amount to more than $1.2 billion over those 30 years.

### 12.1 Cost Effectiveness of Media Advertising

California spent an average of 72 cents ($CAN 1999) per capita per year on its anti-tobacco media program between 1989 and 1996, during the period that per capita consumption of cigarettes fell 1.93 packs per year faster than the rest of the United States. Dividing the rate of that additional consumption decline by the average annual per capita media expenditure of 72 cents yields an estimate of a fall of 2.7 packs per capita per year for each per capita dollar spent on the media campaign.[179]

Assuming the Nova Scotia advertising campaign yielded similar results for the same investment, then an investment of $677,520 per year for seven years would reduce cigarette consumption by an additional 2.5 million packs a year for seven years. That would produce annual savings of $14 million a year in avoided health care costs and productivity losses due to absenteeism and premature death, or a saving of more than $20 for every one dollar invested in the media campaign. In addition, Nova Scotia smokers would save another $12.5 million a year in money they were not spending on cigarettes.

After seven years, the media campaign will have brought cigarette consumption down by 30%. Nova Scotians will be living longer, getting sick less, and saving a lot of money. Specifically, in those seven years they will have saved 64,500 potential years of life that would have been lost if they kept smoking at today's rates, and they will have saved $98 million for an investment of $4.7 million. Gradually, Nova Scotia hospitals will become less burdened, and health care costs will be eased.

The reason the estimated annual decline here is somewhat smaller than the two year figures given in the section above is simply that the figures here are averaged over *seven* years rather than two, and include periods when tobacco advertising was reduced and consumption flat. Also, they measure only the portion of consumption reduction in California that was in excess of the overall U.S. rate of consumption decline, rather than attributing a portion of total decline to the media campaign as do the figures above. For these reasons, this estimate of a 2.7 pack decline for every one dollar spent is a conservative and reasonable long-term estimate that factors out the normal background rate of consumption decline not attributable to media advertising.

One methodological note of caution: The cost-benefit ratios of these various tobacco control interventions cannot easily be compared. The monetary cost-benefit ratio given here uses the incidence-based approach, which yields higher results than the prevalence-based approach adopted in the school and prenatal care estimates given above. In those cases this report simply used already established cost-benefit ratios estimated by other investigators. In this case, we have translated the dollar-per-pack cost-benefit ratio into monetary estimates derived from the incidence-based approach used to estimate the benefits of smoking cessation.

[179] Goldman and Glantz, op. cit. Page 773

If a comparison with the previous cost-benefit analyses is required, then the most reasonable estimate might be to use the ratios reported in Phillips' literature review ("The Economics of Smoking," 1993) which found a 2.22:1 cost benefit-ratio in prevalence-based approaches compared to a 7:1 cost-benefit ratio in incidence-based approaches. This would reduce the 20.6:1 cost-benefit ratio reported above to a 6.5:1 ratio had a prevalence-based approach been used.

In that case, a rough comparison of cost-benefit results presented so far in part three would be:

- School-based prevention programs: 15:1 ($15 benefit for every $1 invested)
- Prenatal counseling: 10:1 ($10 benefit for every $1 invested)
- Media advertising campaign: 7:1 ($ 7 benefit for every $1 invested).

As noted before, the evidence indicates that all cost-benefit ratios are enhanced when several strategies are used together in a coordinated way. All three interventions have different target audiences, and can mutually reinforce the messages transmitted through each means. A child who returns from a smoking prevention lesson in school may see an anti-tobacco advertisement on TV, or a pregnant mother receiving counseling on smoking cessation gets a stern lecture from her school-age child.

### 12.2 Media advertising can counter industry price manipulation

California is not the only example of highly successful use of media advertising to reduce tobacco consumption. A Massachusetts referendum initiative, similar to California's Proposition 99, also resulted in a 25-cent tobacco tax increase in 1993, with funds specifically dedicated to anti-tobacco activities. In this case, however, the industry counter-attacked by reducing wholesale prices to the pretax level, thus effectively eliminating the price increase associated with the tax.

However, the increased government revenues funded a powerful anti-tobacco media campaign that began in October, 1993, and Massachusetts cigarette consumption continued to decline at a rate of 1.28 packs per person per year faster than the national average from 1993 to 1996. This indicates that the media campaign was effective despite the nullification of the price increase.[180]

The Massachusetts experience well illustrates the main point in the introduction to Part 3, and carries a vitally important lesson for Nova Scotia's own tobacco control strategy. A suite of tobacco reduction strategies working together is far more effective than any single measure alone. Indeed, as noted above, the cost-effectiveness of each measure is multiplied by its association with complementary measures.

It must be acknowledged that Nova Scotians, and Canadians in general, are today particularly susceptible to industry counter-measures on the price front as a result of the ill-advised tobacco tax decrease in February, 1994 and the consequent jump in industry sales and profits. Even though tax increases are recognized by the World Bank and other authorities as the single most cost-effective tobacco control measure, the industry has

[180] Goldman and Glantz, op. cit., pages 773-774 and 776.

enough play in manipulating market prices at this historical juncture to counter such tax increases by lowering prices, as occurred in Massachusetts.

Since the tobacco tax cut in 1994, as noted earlier, Imperial Tobacco has raised its prices six times, and increased its pre-tax profit margin by 50% from 40 cents per pack to 60 cents per pack, producing record-breaking earnings and profit-taking. Because Imperial Tobacco controls 68% of the Canadian cigarette market, it effectively sets the prices for the industry as a whole, and the other companies follow its price lead.[181]

Imperial Tobacco annual reports reveal the following price increases:

- April 1996: 3.2%
- December, 1996: 3.6%
- April, 1997: 2.9%
- October, 1997: 4.3%
- April, 1998: 4.4%
- April, 1999: 4.4%[182]

In other words, with huge profit margins due to the 1994 tobacco tax cut, the Canadian tobacco industry now has even more leeway to counter tobacco price increases with price-cutting counter-measures than the U.S. tobacco industry had in reacting to the 1993 Massachusetts initiative.

Indeed, just three companies - Imperial (68%), Rothmans, Benson and Hedges (22%), and RJR-Macdonald (10%) control 99% of the Canadian tobacco market, and can therefore act in concert to manipulate market prices. A coordinated government strategy to counter tobacco use is far more threatening to all three companies than competition among themselves.

However, the high likelihood of industry price manipulation in response to any tax hike need not deter governments from acting for two basic reasons. First, the change effectively involves a massive transfer of funds from the tobacco industry to the public purse, just as the tobacco tax cut produced a massive transfer of funds in the opposite direction. Secondly, as the Massachusetts experience demonstrates, the additional revenues can be effectively used to fund a wide range of other prevention and cessation measures.

Indeed, if even a modest portion of tobacco tax revenues is dedicated to *other* tobacco control activities, then the tobacco industry cannot win, because the combined effect of a coordinated suite of measures will outweigh industry counter-measures. An analysis of the California and Massachusetts experiences revealed that:

> *Paid media is most effective when used as part of a multifaceted approach to reduce smoking, including community, including community programs, higher*

[181] Canadian Cancer Society, *Surveying the Damage*, pages 46-47; industry information and market share is available under "Canadian Tobacco Companies" and "Canadian Tobacco Industry" at the following web site: http://persweb.direct.ca/rjordan/Canadian_industry.htm

[182] *Surveying the Damage*, page 46.

*taxes, and school-based programs. Because the various program elements are designed to work together, it is difficult to separate the effects of paid media from other contemporaneous tobacco control interventions.*[183]

### 12.3 What Type of Advertising Works Best?

In selecting the most appropriate form of anti-tobacco advertising, it is fortunate that Nova Scotia does not have to re-invent the wheel. Detailed analyses and follow-up surveys of the California and Massachusetts advertising campaigns have revealed the particular forms of advertising that proved most effective in those states. Needless to say, such ongoing marketing studies are essential, as in any business, to assess the cost-effectiveness of particular advertising strategies in reaching the public.

Focus group studies were conducted by the professional advertising agencies that contracted with California, Massachusetts and Michigan to run their anti-smoking advertising campaigns in order to assess their effectiveness. As well, the state health departments produced their own reports and studies on program effectiveness, and the U.S. Centers for Disease Control and Prevention have produced a *Media Campaign Resource Book.*[184]

A review of all these sources, including the reports of 186 focus groups was conducted by the Institute for Health Policy Studies in the Department of Medicine at the University of California, San Francisco.[185] It found that the most effective advertisements were those that attacked the tobacco industry for deceitful and manipulative practices to hook new users, sell more cigarettes and make more money, and those portraying the dangerous effects of secondhand smoke on nonsmokers. Youth, in particular, responded well to learning about industry's calculated attempts to manipulate them; and secondhand smoke advertisements showed adult smokers how their habits endanger their own children.

Next most effective were advertisements portraying the addictive nature of nicotine. Particularly effective for youth was the message: "74% of all smokers aged 12 to 18 say they wish they could quit but can't because they are addicted to the nicotine." Among several other strategies reviewed, advertisements describing the long-term health effects of smoking were among the least effective, mostly because the health hazards are already well known, and because young people tend to "live in the present and to believe they are invulnerable."[186] In short, Nova Scotia can target its advertising dollars *more* cost-effectively than pioneers like California and Massachusetts, because it can learn from their experience what works best and focus its media campaign on the most effective advertisements.

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[183] Ibid., page 773

[184] U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, *Media Campaign Resource Book,* Atlantic, November, 1995.

[185] Goldman and Glantz, esp. pages 772 and 774-776

[186] Ibid. page 775

## 13. Physician Advice, Counseling, Nicotine Replacement Therapy

Several studies have found that even brief advice to quit by a physician is very effective in motivating smokers to stop smoking. This is confirmed in the 1999 Canadian Tobacco Use Monitoring Survey, which reports "concern about future health" as by far the most important reason for quitting. Among quitters, 62% cited health concerns or health problems as their main reason for quitting.[187] Given that motivation, well-timed and skillful physician advice can be a powerful smoking cessation tool.

Health Canada reports:

> *The doctor's office is a site with great potential for effective intervention on tobacco use.... However, only half of current smokers report having ever been asked about their smoking status or advised to quit by their physician, and even fewer have received specific advice on how to quit. Still, smokers may see their physician with greater frequency than any other service provider.* [188]

Although 77% of current smokers in Canada see a doctor at least once a year, only 41% of this group are advised to quit.

This lost opportunity to save life and promote health may be a deeper reflection of a medical system focused on sickness treatment rather than disease prevention. A highly cost-effective tobacco cessation strategy may therefore be a reform of medical school education. In the short term, the medical profession can advise its own members that inquiry about smoking status and advice on cessation should be a routine part of every smoking patient's visit.

Smokers who get professional help to quit, through counseling, nicotine replacement therapy, or both, have higher long-term cessation rates than those who try to quit without such help. Nicotine replacement therapy (patches, gum or inhaler) helps the smoker deal with nicotine withdrawal symptoms, and can also be effective in reducing the amount of cigarettes consumed when smokers are unable or unwilling to stop quit abruptly.

Health Canada reports that clinical, intensive interventions, both group and individual, involving at least 4-7 counseling sessions over several weeks, have remarkably high quit rates, often over 20%. These currently reach only about 5% of the population. Public health approaches can reach much larger population groups (up to 80%) but register lower quit rates (5%-15%).[189]

A well-known study at the Mayo Clinic Nicotine Dependence Centre examined the cost effectiveness of its treatment program for nicotine dependence. In that program, an initial 60-minute consultation was followed by counseling to develop an individual nicotine dependence treatment plan which could include nicotine replacement therapy (patches or

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[187] *CTUMS* 1999, supplementary tables, Table 9; *CTUMS* Fact Sheet #7.
[188] Health Canada, *Guide to Tobacco Use Cessation Programs in Canada*, available on the Health web site at: http://www.hc-sc.gc.ca/hppb/tobaccoreduction/pub/tobrpt1.htm#effective
[189] Idem.

gum), group therapy, or an inpatient program. As well, a relapse prevention program included telephone calls and letters to patients. The study assessed cost-effectiveness in terms of net years of life gained per dollar invested. The program was given credit only for cessation rates beyond the normal expected cessation rates in the general population.

For all smokers in the United States who attempt to stop smoking, there is an average one-year cessation rate of 7.6%. The Mayo Clinic program produced a one-year cessation rate of 22.2%. At a net cost of $9,430 ($CAN1999) per net year of life gained (at a 5% discount rate) beyond what would be expected through normal population cessation rates, the researchers concluded:

> *From a cost-outcome perspective, the treatment of nicotine dependence is highly favorable when provided by non-physician health-care professionals in a medical setting.*[190]

The study further compared the cost-effectiveness of the program to a wide range of other medical interventions and found it highly cost-effective in terms of dollars invested per year of life gained. For example, it was four times as cost-effective as breast cancer screening, treatment of moderate hypertension, or estrogen replacement therapy, and 1.5 times as cost-effective as nicotine gum therapy combined with counseling. However, it was only one-third as cost-effective as brief advice by a physician, and only one-half as cost-effective as smoking cessation programs for pregnant women.

If these comparative outcomes are very roughly translated into our earlier assessment, the relative outcomes might be:

- School-based prevention programs: 15:1 ($15 benefit for every $1 invested)
- Brief advice by a physician 12:1 ($12 benefit for every $1 invested)
- Prenatal counseling: 10:1 ($10 benefit for every $1 invested)
- Media advertising campaign: 7:1 ($ 7 benefit for every $1 invested)
- Mayo Clinic program 4:1 ($ 4 benefit for every $1 invested)
- Nicotine gum and advice 3:1 ($ 3 benefit for every $1 invested)

This study does not give too much weight to such comparative analysis, principally because none of the components work alone. Nicotine replacement therapy can appear expensive in a traditional cost-benefit analysis, and yet be crucial to a quitter's ultimate success in kicking the habit. The cost-benefit analysis is also extremely sensitive to small changes in assumption. For example, the World Bank's global survey estimated that if nicotine replacement therapy (patches, gum or inhaler) were publicly provided with 25% coverage, it would be highly cost-effective, second only to tax increases.

When privately purchased at today's prices in Nova Scotia, nicotine patches cost $34 for 7 patches or $60 for 14 patches. Nicotine gum costs $37 for 105 two-mg pieces and $44 for 105 four-mg pieces.[191] Nicotine replacement therapy can therefore cost up to $140 a month, a high enough price to discourage some potential users among low-income groups

[190] Croghan, Ivana, et. al., "Cost-Effectiveness of Treating Nicotine Dependence: The Mayo Clinic Experience," *Mayo Clinic Proceedings*, volume 72, 1997, pages 917-924.
[191] Prices supplied by Lawton's Drug Store, Halifax.

who have high smoking rates. Quebec health insurance has just begun paying for nicotine therapy at a projected cost to the government of $5 million in the first year. Nevertheless, Quebec has decided that the investment is a bargain at 0.75% of the cost of current health care treatments for smoking-related diseases.[192]

The U.S. Surgeon-General has recommended changes in physician practices and insurance coverage to encourage state-of-the-art treatment of nicotine addiction, which could boost quitting rates ten times. He argued that spending $US6.3 billion would pay for smoking cessation programs for 75% of U.S. smokers, and result in 1.7 million smokers quitting, an investment he said would prove cost-effective.[193]

The main reason that nicotine replacement therapy in isolation ranks lower on some cost-benefit analyses than other tobacco control initiatives, is that studies have estimated that 15 patients have to use nicotine replacement therapy to produce one extra quitter.[194] This confirms again the importance of using a wide-range of coordinated tobacco control strategies to achieve the maximum benefit per dollar invested. Within the framework of other interventions, nicotine replacement therapy can be effective in easing smoking withdrawal symptoms and thus in promoting long-term cessation. But in isolation it is likely to have much more limited effectiveness.

Finally, it should be mentioned that studies of community incentive-based interventions, like "Quit and Win" contests have not so far been proven effective in the long term.[195] One analysis of two such programs in Ontario found the program was successful for only 0.17% of the smoking population, with just one in every 588 smokers in the community actually quitting because of the contests.

The authors concluded the rate of impact of such interventions to be low, and recommended that public health agencies recognize their "limited success in reaching and affecting certain sector of society." They noted that "such groups may be better served by other population-based approaches, such as price increases...or promotion of more individualized support,"[196] rather than by gimmicks that have a high profile in the short-term but little proven long-term effect.

In other words, from the evidence, it seems wise for Nova Scotia to stick with proven tobacco control strategies like tax increases, school-based programs, prenatal counseling, media advertising, and promotion of physician advice, professional counseling and nicotine replacement therapy.

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[192] Conway Daly, "Quebec Out to Discourage Smoking: Province Now Pays for Patches, Nicotine Gum, Zyban," *The Chronicle-Herald*, Halifax, 5 October, 2000, page A15.
[193] Picard, Andre, "Surgeon-General aims to halve U.S. smoking rate," *The Globe and Mail*, 10 August, 2000, page A5
[194] Bunney, Robert, "Paying for Nicotine Replacement Therapy is Cheaper than Smoking <20 cigarettes a Day," *British Medical Journal*, volume 318, 27 February, 1999, page 605.
[195] Bains, Namrata, William Pickett, Brian Laundry and Darlene Mecredy, "Predictors of Smoking Cessation in an Incentive-Based Community Intervention," *Chronic Diseases in Canada*, volume 21, no. 2, 2000, Health Canada, Laboratory Centre for Disease Control.
[196] Ibid., page 8.

## *14. Smoking Bans and Restrictions*

Second-hand smoke contains 4,000 different chemicals, of which more than 50 are known carcinogens. It causes more than ten lung cancer deaths a year in Nova Scotia, an estimated 1,000 respiratory tract infections such as pneumonia and bronchitis in children, and a worsening of the asthmatic conditions of up to 4,000 more children. Second-smoke can impair lung function, and is estimated to increase heart disease risk by three times and chronic middle-ear infection in children by 3.5 times.

Environmental tobacco smoke has been classified by the U.S. Environmental Protection Agency as a Group 1 carcinogen, a classification reserved only for those compounds shown to cause cancer in humans based on studies in human populations. Exposure to second-hand smoke has been shown to increase the risks of later smoking and nicotine dependence in children.[197]

Bans and restrictions on smoking in public places, especially schools, day care centres, health facilities and workplaces, are an essential component of any effective tobacco control strategy. In addition to protecting non-smokers, such restrictions have been demonstrated to reduce consumption among smokers. As noted earlier, daily smokers who work in smoke-free work places smoke four fewer cigarettes per day on average than those who have no such restrictions, for an average reduction of 22% in consumption.

### 14.1 Bylaws Restricting Smoking in Public Places

A comparative study in Canada found that the likelihood of being a smoker is reduced where smoking bylaws are widespread, even after age, sex, education and marital status are controlled. The study concluded that no-smoking bylaws are effective in controlling smoking, and are most effective where cigarette prices are also high.[198]

A Health Canada study found that Atlantic Canadians are far less likely to be protected by bylaws restricting public smoking than other Canadians. The 1995 study found that eighty-one percent of the Ontario population is protected by such bylaws, compared to just 3% in Newfoundland, 13% in P.E.I., 27% in Nova Scotia, and 30% in New Brunswick -- the lowest rates in the country.[199]

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[197] Health Canada, *Statistical Report on the Health of Canadians,* page 65; United States Environmental Protection Agency, "Setting the Record Straight: Secondhand Smoke is a Preventable Health Risk," EPA publication no. 402-F-94-005, June, 1994 (also used to derive estimates for Nova Scotia numbers in these two paragraphs); Nova Scotia Department of Health, *Smoke-Free Places: Towards Healthier Communities in Nova Scotia: A Discussion Paper,* 1997; Health Canada, "Passive Smoking: Nowhere to Hide," available at http://www.hc-sc.gc.ca/hppb/tobaccoreduction/factsheets/passive.htm; National Research Council, Committee on Passive Smoking, Board on Environmental Studies and Toxicology, *Environmental Tobacco Smoke" Measuring Exposures and Assessing Health Effects,* National Academy Press, Washington D.C., 1986.

[198] Thomas Stephens, Linda Pederson, John Koval, and Charles Kim, "The Relationship of Cigarette Prices and No-Smoking By-Laws to the Prevalence of Smoking in Canada," *American Journal of Public Health,* 1997, 87, pages 1519-1521.

[199] Health Canada, *Statistical Report,* pages 63-64.

This is ironic, because the 1996-97 National Population Health Survey also found that Atlantic Canadians are the *most* strongly in favour of smoke-free environments among all the provinces, and are *more* aware than other Canadians about the damaging health effects of second-hand smoke.[200] In other words, public support for smoke-free environments appears to be greater in the Atlantic provinces than in the rest of the country, and Atlantic Canadians seem to be far readier for more public smoking restrictions than governments are to impose them.

There is no apparent reason for this. A 1996 York University survey of attitudes among provincial legislators found that legislators from the Atlantic provinces generally voiced greater support for a major government role in smoking prevention and cessation than those from other parts of Canada. Nova Scotia legislators registered the highest rates of any province, more than 30% above the national average.[201]

Sixty percent of Nova Scotia legislators also supported a ban on cultural event sponsorship by tobacco companies, again the highest rate of support in the country, and 30% higher than the national average. According to those results, Nova Scotia should be the country's leader in tobacco control legislation. Interestingly, Nova Scotia legislators also reported less contact on smoking issues by representatives of non-profit health organizations than legislators in any other province.[202] This indicates that the missing link may be more active lobbying by health groups.

In short, it appears that both the necessary public support and the legislative willingness to pass bylaws restricting smoking in public places exist in Nova Scotia, and that this area is a fertile area to move forward without delay. It is a significant issue in the current municipal election in industrial Cape Breton, and it is possible that this conference, on the eve of that election, may raise awareness of the issue.

Again, a major theme of this report -- that the cost-effectiveness of different tobacco control initiatives is enhanced when several strategies are employed in a coordinated way -- is demonstrated by the California experience. Passage of Proposition 99, which increased tobacco taxes and used the money for school and community tobacco education programs, *also* galvanized dozens of California cities into passing bylaws requiring restaurants, work-places and public buildings to be 100% smoke-free (without designated smoking areas.)[203] It is therefore highly likely that implementation of the other measures described in Part 3 would also lead to a profusion of anti-smoking bylaws in Nova Scotia towns and municipalities.

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[200] Nancy Ross and Claudio Perez, "Attitudes toward Smoking," Statistics Canada, *Health Reports*, volume 10, no. 3, Winter 1998, page 27.

[201] De Guia, Nicole, et. al, "How Provincial and Territorial Legislators View Tobacco and Tobacco Control: Findings from a Canadian Study," *Chronic Diseases in Canada*, volume 19, no. 2, 1998, Health Canada, Laboratory Centre for Disease Control, Table 2.

[202] Ibid., Tables 3 and 5.

[203] Breslow, Lester, and Michael Johnson, "California's Proposition 99 on Tobacco, and Its Impact," *Annual Review of Public Health*, volume 14, 1993, pages 585-604. See particularly page 600 for impact on passage of anti-smoking bylaws.

A word of caution about no-smoking bylaws is in order. Of Canadian municipalities that had passed such bylaws by 1995, Health Canada found that just 68% made an explicit provision for enforcement, and only 12% both identified the responsibility for enforcement and specified escalating fines for repeated offences. As well, only 29% required that visible signs be posted to inform the public of the existence of restrictions.[204] In other words, the existence of a bylaw may not be enough. How it is written and enforced is equally important.

The U.S. Environmental Protection Agency has estimated that, in *addition* to long-term cost savings from health benefits, life-years gained, and productivity losses avoided, smoking restrictions in most public places would produce $4-$8 billion worth of direct savings every year in avoided housekeeping and maintenance expenses. Translated to Nova Scotia numbers by population size, those immediate and short-term savings amount to $14-$28 million a year.[205]

In addition to general smoking restriction bylaws, the three most important current targets for specific smoking bans are the workplace, schools, and the home, the last of which is clearly not subject to external regulation but dependent on education.

## 14.2 Smoking Bans in the Workplace

As described earlier, it has been estimated that up to 80% of the average nonsmoker's exposure to second-smoke is in the workplace, with restaurant and bar employees at particular risk of smoking-related illnesses, including a 50% higher risk of lung cancer.[206] Passive smoking over an eight-hour day has been estimated to equate to light active smoking, and there is mounting evidence that second-hand smoke actually reduces the work efficiency of non-smoking employees, a cost not included in our earlier estimates of the "Costs of Employing a Smoker."[207]

The mechanisms by which work efficiency and health are affected have been studied. Nonsmokers who inhale the toxic gases, particles and chemicals both from the lighted end of a cigarette and from the smoker's own exhalation, also have small amounts of nicotine and carbon monoxide pass into their own bloodstream. After half an hour, the blood pressure and heartbeat of these nonsmokers has been found to rise measurably, indicating extra stress placed on the heart.[208]

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[204] Health Canada, Health Protection Branch, Office of Tobacco Control, *Smoking By-laws in Canada 1995*, and Health Canada, *Statistical Report on the Health of Canadians*, page 63.

[205] U.S. Environmental Protection Agency, op. cit., page 7.

[206] Health Canada, "Smoking on the Job: Trends and Issues," available at: http://www.hc-sc.gc.ca/hppb/tobacc...tions/workplace/work/wplcsmk02.htm ; Nova Scotia Department of Health, *Smoke-Free Places: Towards Healthier Communities in Nova Scotia: A Discussion Paper*, pages 3-4, citing sources from the Heart and Stroke Foundation, *Journal of the American Medical Association*, and *Canadian Medical Association Journal*, (footnotes 1, 2, 8, and 9, p. 4).

[207] Price, Philip, *Passive Smoking: Health Effects and Workplace Resolutions*, Canadian Centre for Occupational Health and Safety, February, 1989, page 3.

[208] Nova Scotia Department of Health, *Smoke-Free Places: Towards Healthier Communities in Nova Scotia, A Discussion Paper*, 1997, page 2.

In addition, chronic exposure to cigarette smoke in the work environment has been found to reduce small airways function to the same extent as smoking one to ten cigarettes a day. Not surprisingly, it has been reported that 25% of nonsmokers in workplaces that have no restrictions on smoking express frustration and hostility towards both smokers and management.[209]

That study, conducted by the Canadian Centre for Occupational Health and Safety, concluded that:

> *Smoking on the job increases absenteeism, property damage, and health and fire insurance costs. It can also lower the morale and productivity of some nonsmoking employees.*[210]

Among nearly 2,000 responses to a Nova Scotia Health Department discussion paper on smoke-free places in 1997, 83% supported introduction of no-smoking regulations in workplaces, and another 79% supported no-smoking regulations for restaurants.[211]

### 14.3 Workplace Smoking Cessation Programs

Smoking bans in the workplace are best combined with smoking cessation programs for those employees who do smoke. A detailed University of Michigan cost-benefit analysis of workplace smoking cessation found that "smoking cessation is a very sound economic investment for the firm, and is particularly profitable when long-term benefits are included, with an eventual benefit-cost ratio of 8.75."[212]

In other words, every dollar invested by a firm in smoking cessation programs for its employees, will yield nearly $9 in long-term benefits. The study found that because of employee turnover, about half of these benefits will actually be realized by the wider community outside the firm, while the other half are realized by the firm itself. However, for the firm itself, "gains from either reduced absenteeism or increased on-the-job productivity are sufficient by themselves to make the work-site program a profitable enterprise," and "a distinct economic winner."[213]

On the 50-50 realization of benefits by the firm and the wider community, the University of Michigan study concludes:

> *Given the magnitude of the net benefits generated by the intervention, however, the firm can afford to 'give up' half of the benefits and still realize an enormous*

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[209] Price, op. cit., pages 3-4.
[210] Ibid., page 6.
[211] Nova Scotia Department of Health, "Public Response to Smoke-Free Places Released," December 3, 1997, available at: http://www.gov.ns.ca/cmns/msrv/nr-1997/nr97-12/97120303.htm
[212] Warner, Kenneth, Richard Smith, Deam Smith and Brant Fries, "Health and Economic Implications of a Work-Site Smoking-Cessation Program; A Simulation Analysis," *Journal of Occupational and Environmental Medicine*, volume 38 , no. 10, October, 1996, pages 981-992. This section should be read in conjunction with the earlier analysis in Part 2 of the Costs of Employing a Smoker.
[213] Ibid., pages 990 and 991.

> *rate of return on its investment. The firm can justifiably claim that it is doing good for the community at the same time that it does well for itself.*[214]

As our earlier analysis of smoking cessation also demonstrated, former smoking employees approach the health profiles of those who have never smoked only gradually. Therefore these benefits accrue gradually at first and become more substantial over time. From that longer-term perspective, the study found that smoking cessation is a "cost-effective investment in employee health," and the "gold standard" of health care interventions.[215]

In terms of life-years saved per dollar invested, the study found, workplace smoking cessation programs were far more cost-effective than almost any other medical intervention:

> *In this context, this work-site intervention likely represents one of the very best investments the firm could make in its employees' health. There are relatively few live-saving interventions covered by the firm's medical insurance that compare favorably with the cost-effectiveness of this smoking-cessation program.*[216]

The Michigan study concludes with a statement that should apply to all the cost-benefit analyses in this report, and is therefore worth quoting in full:

> *We have never believed that a health-promotion program must yield a positive financial return to justify its existence. Firms interested in their employees' welfare should see an intervention such as the one studied here to be an extraordinary investment in their employees' health.*
>
> *This work-site intervention grants employees additional years of life at a cost well below that of nearly all of the medical interventions the firm covers through its conventional health insurance. We consider the fact that the program also generates a handsome economic return a very welcome bonus.*[217]

Considering that the Canadian Centre for Substance Abuse found only $14,000 ($1999) of investment in workplace cessation programs in Nova Scotia in its 1992 analysis, and in light of the unequivocal findings of the University of Michigan study, this is a clear area for worth-while investment. In light of the Michigan study's estimate that 50% of workplace smoking cessation benefits redound to the wider community, this report recommends that a comprehensive government tobacco control strategy offer a 50% matching grant to any firm implementing an approved and effective workplace smoking cessation program.

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[214] Ibid., page 991.
[215] Ibid., page 990.
[216] Idem.
[217] Ibid., page 991

### 14.4 Smoking Restrictions in the School and Home

All the tobacco control strategies designed to reduce smoking among children and teenagers outlined earlier should be accompanied by efforts to ban smoking in schools and homes for optimal effectiveness. A cross-sectional study of the comparative effect of the impact of different types of smoking restrictions on more than 17,000 U.S. teenagers found that home smoking bans were the most effective of all public place restrictions in preventing smoking uptake and reducing smoking prevalence.

The study results, recently published in the *British Medical Journal* showed that:

> *Stronger public places restrictions had a significantly protective effect on smoking prevalence, and that home smoking restrictions had a stronger protective effect.*

When compared with households that did not have smoking bans, the study also found that total home smoking bans had the strongest impact on preventing smoking among younger teenagers, but had a significantly deterrent effect at all ages.[218]

As 47% of Nova Scotia households buy tobacco products in a year, education on the harmful effects of second-hand smoke and advocacy of home smoking bans will also protect thousands of nonsmoking Nova Scotia children. Currently only 34% of daily smokers in Nova Scotia report that there any smoking restrictions in their homes. About one-third of daily smokers with children in Nova Scotia are potentially exposing at least one child to second-hand smoke because they have no house ban on smoking.[219]

This means that about 15,000 Nova Scotia children are likely exposed to the harmful effects of second-hand smoke on a daily basis. In Cape Breton, the proportion of children exposed to second-smoke appears to be particularly high. As Figure 2 above demonstrates, 35% of Cape Bretoners live in households where other family members smoke, compared to just 25% in the Halifax area. Across Canada, the National Population Health Survey found that about 22% of non-smoking teenagers age 15-19 experience daily exposure to second-hand smoke at home, a practice that not only endangers their health but makes it more likely that these teens will take up the habit.[220]

Home smoking bans do not only protect children and teenagers. Studies in Europe, North America and Asia have all confirmed that "the risk of lung cancer is roughly 30% higher for nonsmoking spouses of smokers than it is for nonsmoking spouses of nonsmokers."[221] In short, home smoking bans work in two vitally important and congruent ways: They

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[218] Wakefield, Melanie, Frank Chaloupka, Nancy Kaufman, C. Tracy Orleans, Dianne Barker, and Erin Ruel, "Effect of Restrictions on Smoking at Home, at School, and in Public Places on Teenage Smoking: Cross-Sectional Study," *British Medical Journal*, volume 321, 5 August, 2000, pages 333-337, especially pages 335 and 336 (quotation.)

[219] Health Canada, *Statistical Report on the Health of Canadians*, page 67, Figure 13 and Table 13a.

[220] Health Canada, *Statistical Report on the Health of Canadians*, page 66.

[221] National Research Council, Committee on Passive Smoking, Board on Environmental Studies and Toxicology, *Environmental Tobacco Smoke: Measuring Exposures and Assessing Health Effects*, National Academy Press, Washington, D.C., 1986, page 10.

*both* protect household members from the harmful effects of second-hand smoke, *and* they effectively reduce smoking among teenagers.

The *British Medical Journal* study concluded:

> *Banning smoking in the home, even when parents smoke, gives an unequivocal message to teenagers about the unacceptability of smoking, as do restrictions on smoking in public places.*[222]

By contrast to the clear and unequivocal results confirming the positive impact of home smoking bans, the same study found far more mixed results in its analysis of the impact of school smoking bans. On the one hand, schools with no-smoking policies have significantly lower rates of student smoking than schools that do not have such policies. On the other hand, although school smoking bans are common, the are very poorly complied with, and relatively ineffective unless strongly enforced.[223]

The study found:

> *School bans had a protective effect on teenage smoking only when they were strongly enforced. This...highlights the importance of enforcing smoke-free policies in schools.*[224]

Where school bans were strongly enforced, the study found an 11% reduction in uptake of smoking. The evidence quite clearly indicates that schools have not done their job simply by instituting a smoke-free policy. From a cost-benefit perspective, school investment in *enforcing* no-smoking policies is the key to producing significant benefits and cost savings in avoided illness, premature death and lost productivity among today's teenagers.

### 14.5 Are Smoking Bans Bad for Business?

The tobacco industry and other opponents of legislation to ban smoking in public places, particularly restaurants and bars, argue that such restrictions will be bad for business. The available evidence does not support that argument. In a general way, some studies point out that anti-tobacco actions are "pro-business" because smoking "has a devastating effect on the business community and the economy...by way of premature deaths, higher insurance premiums, increased absenteeism due to illness, and lost productivity."[225] Evidence presented in this report on the costs of employing a smoker support this conclusion.

More detailed empirical studies have specifically tracked the effect on sales of restaurants and bars where smoking bans are enforced, and concluded unequivocally that "smoke-

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[222] Wakefield et. al., op. cit., page 334.
[223] Idem.
[224] Ibid., page 336.
[225] Moore, Michael and Charles Mikhail, "A New Attack on Smoking Using an Old-Time Remedy," *Public Health Reports*, volume 111, May-June 1996, page 199.

free ordinances do not adversely affect either restaurant or bar sales."[226] Two comprehensive analyses in 1994 and 1997 matched restaurant and bar sales over time in cities with and without ordinances mandating smoke-free restaurants and/or bars. The studies included every single restaurant within town limits in 30 towns and cities in California and Colorado, and found:

> *Smoke-free ordinances generally had no statistically significant effect, either on the fraction of total retail sales that went to restaurants or on the ratio between sales in smoke-free cities and sales in comparison cities....There were no significant effects of the smoke-free ordinances on bar sales as a fraction of total retail sales, on the ratio between bar sales in cities with ordinances and sales in comparison cities, or on the fraction of all eating and drinking place revenues reported by establishments that sell all types of liquor.*[227]

That study concluded:

> *Legislators and government officials can enact health and safety regulations to protect patrons and employees in restaurants and bars from the toxins in secondhand tobacco smoke without fear of adverse economic consequences.*[228]

The phrasing of this recommendation is an important reminder that the major victims of second-hand smoke in bars and restaurants are the employees, who are 50% more likely to get lung cancer than workers in other industries.[229]

## 15. EPILOGUE

### 15. 1 Two notes to Readers:

1) While providing a general survey of the potential cost-effectiveness of various tobacco control strategies, this study does not pretend to include all potential measures. For example, litigation against the tobacco industry to recover health care costs due to smoking has proved highly effective in the United States, and is a clear strategy to shift the costs of smoking from the public purse to the manufacturers of a product acknowledged to be lethal. It is hoped that this study will stimulate further analysis of other effective tobacco control strategies beyond those presented here.

2) A second important future direction for analysis is particularly relevant for policy makers. This study has examined the costs of smoking, the economic benefits of

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[226] Glantz, Stanton and Lisa Smith, "The Effect of Ordinances Requiring Smoke-Free Restaurants and Bars on Revenues: A Follow-Up," *American Journal of Public Health*, volume 87, no. 10, 1997, pages 1687-1693, quotation on page 1687. See also the earlier study by the same authors, "The Effect of Ordinances Requiring Smoke-Free Restaurants on Restaurant Sales," *American Journal of Public Health*, volume 84, no. 7, July 1994, pages 1081-1085.

[227] Ibid., 1997, pages 1688-1689.

[228] Ibid., page 1690.

[229] Siegel, Michael, "Involuntary Smoking in the Restaurant Workplace," *Journal of the American Medical Association*, volume 131, November, 1984, page 1201.

cessation, and the cost-effectiveness of various tobacco control strategies in isolation from other policy options. In a world of limited financial resources, and competing claims on the public purse, policy makers do not only have to be convinced of the cost-effectiveness of a particular policy option, but also of its cost-effectiveness in relation to other investment opportunities.

For that reason, future studies should compare the results presented in this study with competing claims on the public purse. To give just one example: There is a strong demand to twin Highway 101. Sixty-five people have died on that highway since 1993, or about 8 people per year. At least some of those deaths may be attributable to the lack of a twinned highway, and others are probably due to drunk driving, driver inattention, and other causes. If we assume that half the deaths on Highway 101 are attributable to lack of twinning, then four lives per year could be saved if the highway were twinned.

It costs about $1 million per kilometre per lane to twin a series-100 highway. The 45-kilometre Cobequid Bypass on Highway 104 cost $112 million, replacing a stretch of road also previously regarded as dangerous. The costs of twinning a significant stretch of Highway 101 might be compared to the $800,000 current Nova Scotia tobacco control budget at a time when more than 1,600 Nova Scotians are dying annually from smoking-related diseases.

The author realizes that this is a provocative example. But it is intended merely to point to the need for comparative studies of the cost-effectiveness of alternative policy options in terms of their potential to save lives, improve well-being, and save long-term costs due to illness and premature death. Such studies would provide a rational basis for decision-making and expenditures from the public purse.

### 15.2 "N.S. - The Non-Smoking Province" -- A Personal Reflection by Brian Jardine.

The following proposal, not found by the author in any book or journal consulted for this study, was offered by Brian Jardine, taxi-driver and proprietor of Share-a-Cab, Halifax. Inquiring as to his passenger's flight destination, and ascertaining that I was en route to present a paper on the costs of tobacco at Cancer Care Nova Scotia's Cape Breton Cancer Symposium, Mr. Jardine offered the following reflection.

It is presented here almost verbatim, because it was so thoughtful, eloquent and simple that I cannot improve on it in any way. Mr. Jardine gave his consent for his thoughts to be included in this presentation. I carried no tape-recorder, so the following is my best recollection of Mr. Jardine's words.

*N.S. - Nova Scotia. I think N.S. should stand for Non-Smoking.*
*We should become the first Non-Smoking Province.*

*We should set a target date, say two years from now, and help all smokers to quit by then. There would be some people, because of their age or the degree of their addiction, who wouldn't be able to quit. They would require a special license to smoke, like a*

*prescription that would only be for the amount they need for their own personal consumption. It should be against the law to pass on cigarettes to anyone else.*

*There'd be some bootlegging at the start. But if cigarettes were not easily available, smoking would go down, and most people would never start. And there could be very heavy punishments for anyone caught trafficking* (author's comment - like heroine or cocaine).

*The important thing is to stop kids from starting. No one wants to see their kids smoke. Being a non-smoking province would stop people from starting. At the beginning some older smokers would keep smoking, but within a few years, with kids not starting and with no one taking up the habit, we'd be a Non-Smoking province.*

*We'd the first, and we should advertise and promote that proudly, because it would attract business and tourism, and other provinces would follow our lead. We'd have signs at the airport and on the border: "Welcome to N.S.: Nova Scotia - the Non-Smoking Province." Nova Scotians would support that. A politician could get elected by promising to do this.*

After endless number-crunching based on "conventional" tobacco control strategies, I was so struck by the simplicity, directness and obviousness of Mr. Jardine's reflection that I asked him if he had just thought of it now, or had been contemplating this for some time.

He replied that he quit smoking 20 years ago, relapsed for a year after 10 years, and then quit again, this time for good. (He also recounted his pain at seeing his daughter begin smoking, and his wife's current difficulty attempting to quit. At the time he himself stopped smoking, Mr. Jardine said, he wrote down every day everything he could think of that he hated about cigarettes. By the time he had done that, he had made himself so angry that he found himself stubbing out cigarettes in disgust. That, he said, got him through the first (and hardest) three weeks. It was at that time that he came to this reflection and conclusion.

And they say Nova Scotians don't like change! Mr. Jardine's suggestion has never been on the policy agenda, and it is not in any book or article I have read. But this study would not have been complete without mention of this simple, straight-forward and obvious strategy that could save more lives, more suffering, and more money than all the tobacco control interventions discussed combined. Is there a politician out there who dares to test Mr. Jardine's certainty that he could get elected on this platform?